HNOLOGY DEPARTMENT

ROADS AND STREETS

FEBRUARY 1948

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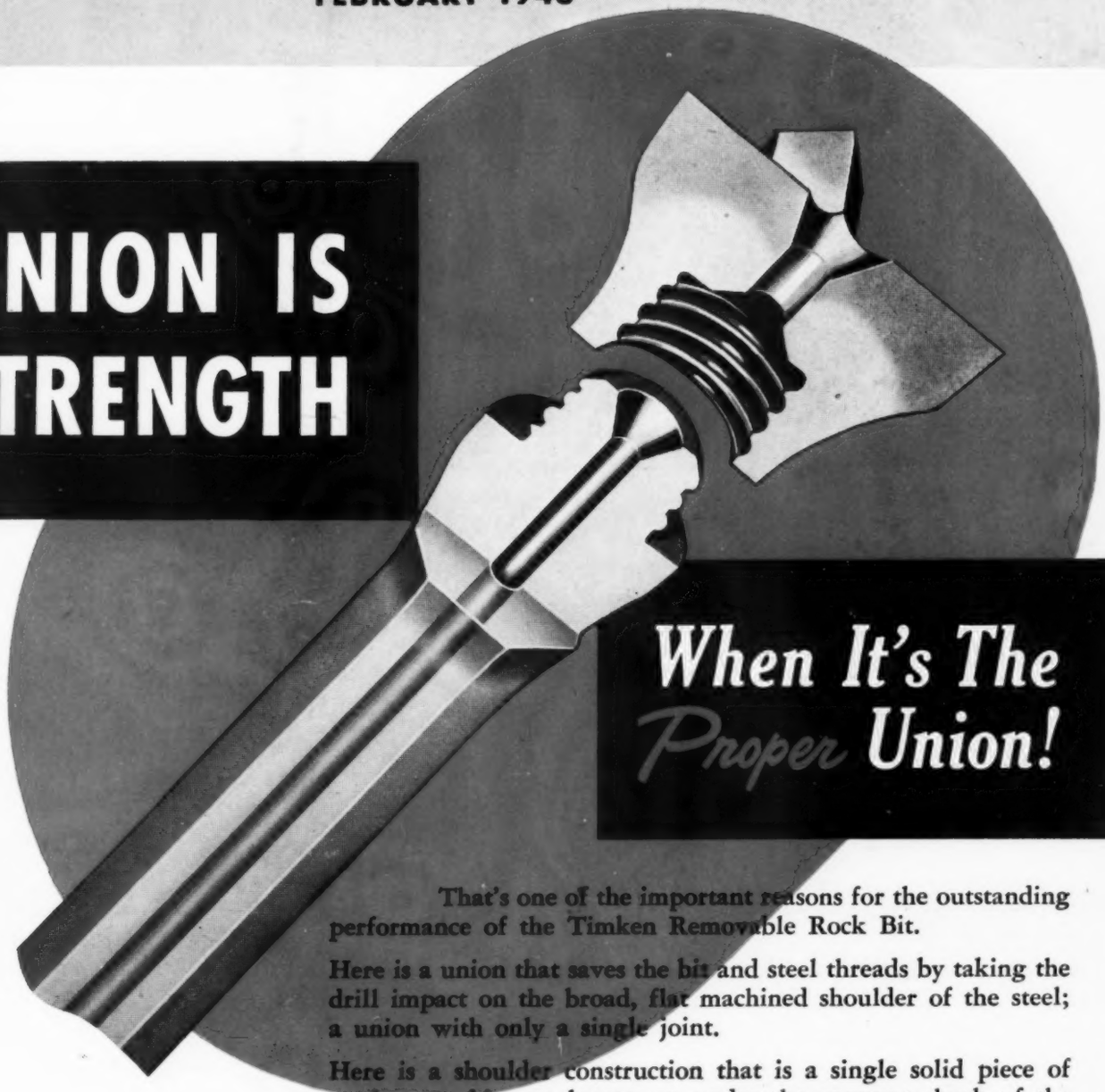
DETROIT

UNION IS STRENGTH



When It's The Proper Union!

That's one of the important reasons for the outstanding performance of the Timken Removable Rock Bit.

Here is a union that saves the bit and steel threads by taking the drill impact on the broad, flat machined shoulder of the steel; a union with only a single joint.

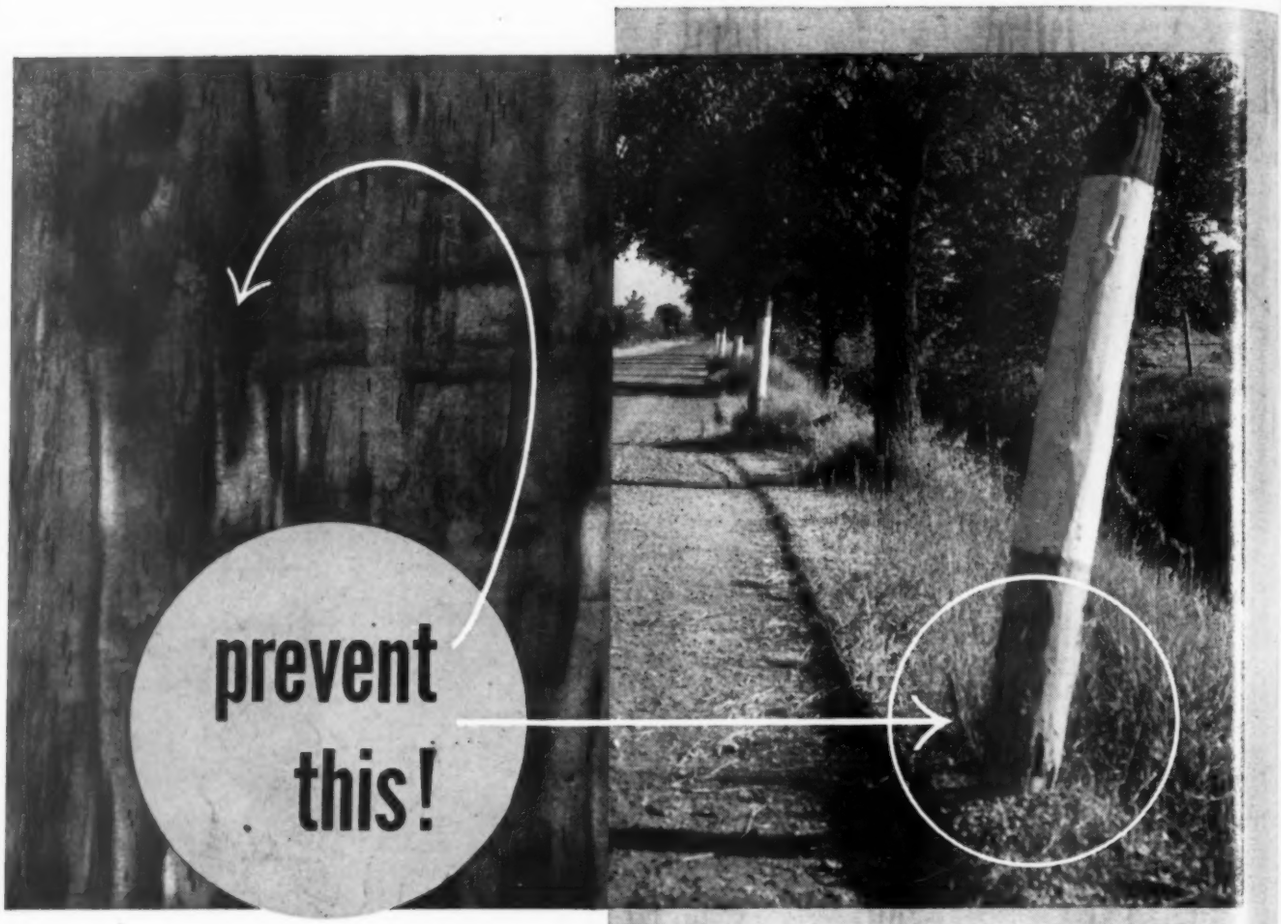
Here is a shoulder construction that is a single solid piece of steel — nothing to loosen up under the constant shock of the hammer blows no matter how hard the rock may be; a shoulder construction that has proved its correctness through 14 years of successful service in mines, quarries and on construction projects of all kinds.

You can't beat the combination of the Timken Rock Bit made of Timken Fine Steel and the original Timken shoulder construction. That's the combination for speed, endurance, uniform performance and economy. Make sure you get it. The Timken Roller Bearing Company, Canton 6, Ohio.

TIMKEN

TRADE-MARK REG. U. S. PAT. OFF.

ROCK BITS



. . . use modern treated wood

By modern treated wood, we mean wood protected with Pentachlorophenol. This proved preservative does more than just prevent costly destruction of wood by decay and termites. Pentachlorophenol is versatile—by proper selection of the oil solvent, it is suitable for the treatment of posts or other wood in contact with the ground, or for roadside furniture and other structures requiring painting.

You will want to specify Pentachlorophenol treated wood. It's a sound investment that pays dividends in reduced maintenance.

Pentachlorophenol is applied to wood at low concentrations in petroleum oils by established pressure and nonpressure treating methods. Pentachlorophenol is available now.

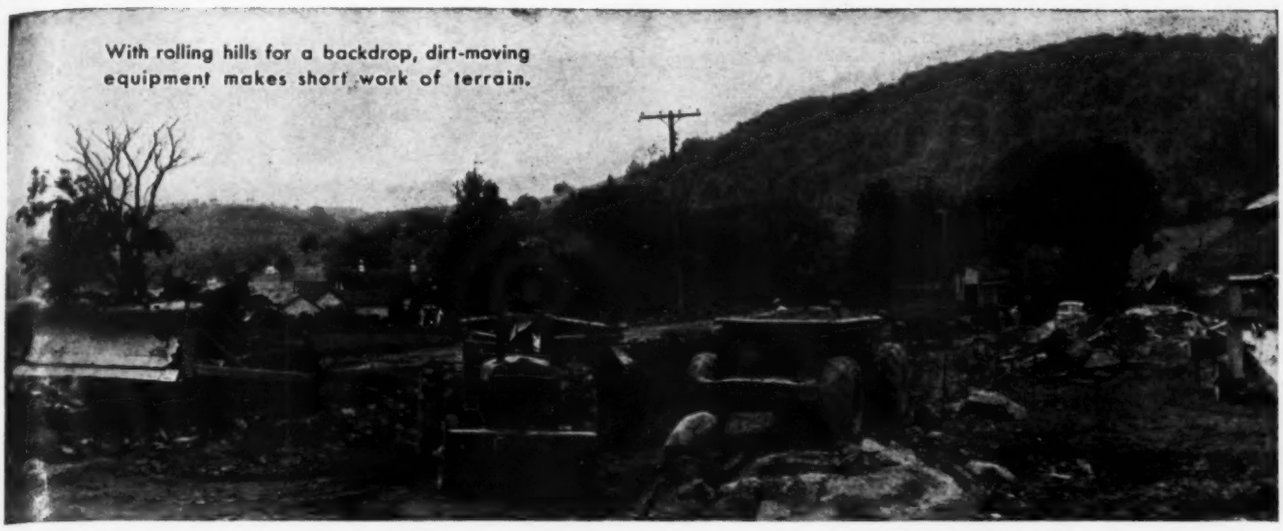
GET THE FACTS. *Send today for this free booklet telling how Pentachlorophenol adds years to the life of wood. Ask for Booklet No. PE 48.*

THE DOW CHEMICAL COMPANY
MIDLAND, MICHIGAN

DECAY
TERMITE
Protected
WITH
PENTACHLOROPHENOL

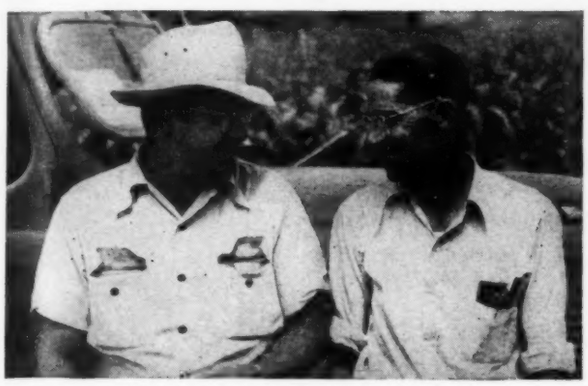
DOW

CHEMICALS INDISPENSABLE
TO INDUSTRY AND AGRICULTURE



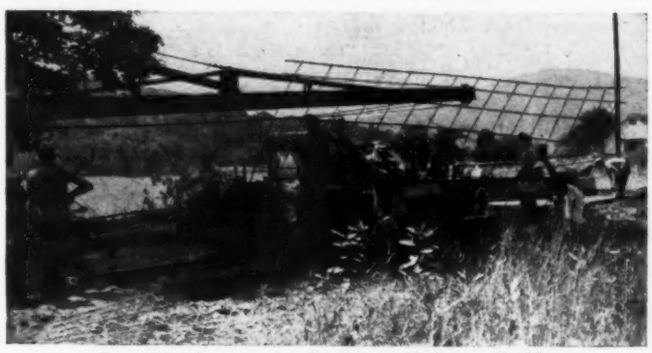
With rolling hills for a backdrop, dirt-moving equipment makes short work of terrain.

Building New Road in the Catskills

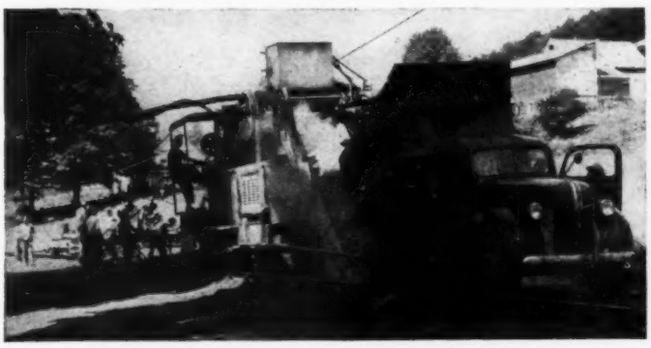


Joseph Serafini, contractor (left), chats with Andrew Moraes, superintendent.

Route 23, popular highway from southwestern Massachusetts to central New York, is now undergoing repair and relocation in the Catskill Mountains area. These photographs were taken between Prattsville and Windham, N. Y., and show construction by Serafini Construction Co., Binghamton, N. Y. Bridge reinforcing, bar mats and road joints were furnished by Bethlehem.



Conveniently stored adjacent to highway, Bethlehem Bar Mat is raised into place after strikeoff.



No time lost here. As workers spade concrete over bar mats, truck dumps new load into skip.

Broom-finished first lane starts to take shape. Here hand finisher completes work on side of slab.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.
On the Pacific Coast Bethlehem products are sold by
Bethlehem Pacific Coast Steel Corporation
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★ BETHLEHEM STEEL ★

STEEL FOR HIGHWAYS

Road Joints Reinforcing Bars Bar Mats
Guard Rail Guard Rail Posts
Wire Rope and Strand Hollow Drill Steel
Spikes Bolts and Nuts
Timber Bridge Hardware Tie-Rods

ROADS AND STREETS

FEBRUARY, 1948 • VOL. 91 • No. 2

With Roads and Streets Have Been Combined Good Roads Magazine And Engineering & Contracting

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How New York City dug out. . . Also why La Guardia field could get planes going so soon

Tunnel Projects
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Bridges
Construction reports soon on large structures in Maryland, Illinois, Ohio, elsewhere

Paving Methods
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Expressways
Brooklyn's new 3-level project

Maintenance
Emulsified asphalt mix for mud-jacking Arkansas pavements

And—Trailer hauling . . . Sod experiment. . . . Air operated center-striping machine. . . Reports on AGC and AED conventions. . . Equipment maintenance ideas. . . Aggregate production.

A magazine devoted to the design, construction, maintenance and operation of highways, streets, bridges, bridge foundations and grade separations, and to the construction and maintenance of airports.

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Ask your local Thew-Lorain distributor for complete data on the "820"—it's the dragline de luxe designed to move big yardage fast and profitably.

THE THEW SHOVEL COMPANY • LORAIN, OHIO

Thew Lorain® 820

Fight Highway Accidents this modern way . . .

PHOTOGRAPH COURTESY—ATHEY PRODUCTS CORPORATION

Two-thirds of all fatal accidents happen at night. Poor lights are the biggest cause. To help check this costly toll, install Keystone Flashing Lights on all your vehicles. They flash 80 "STOP" warnings per minute—to both front and rear. Completely visible through swirling snow. Act as a "lighthouse" to promote highway safety.

Keystone Flashing Lights have been used successfully for many years by countless cities, counties, townships, park and bridge commissions, state highway departments, contractors, public utilities, etc., on all types of vehicles. Write us to send you a light for inspection. Auto Gear & Parts Co., Inc., s.e. cor. 16th St. and Hunting Park Ave., Philadelphia 40, Penna.

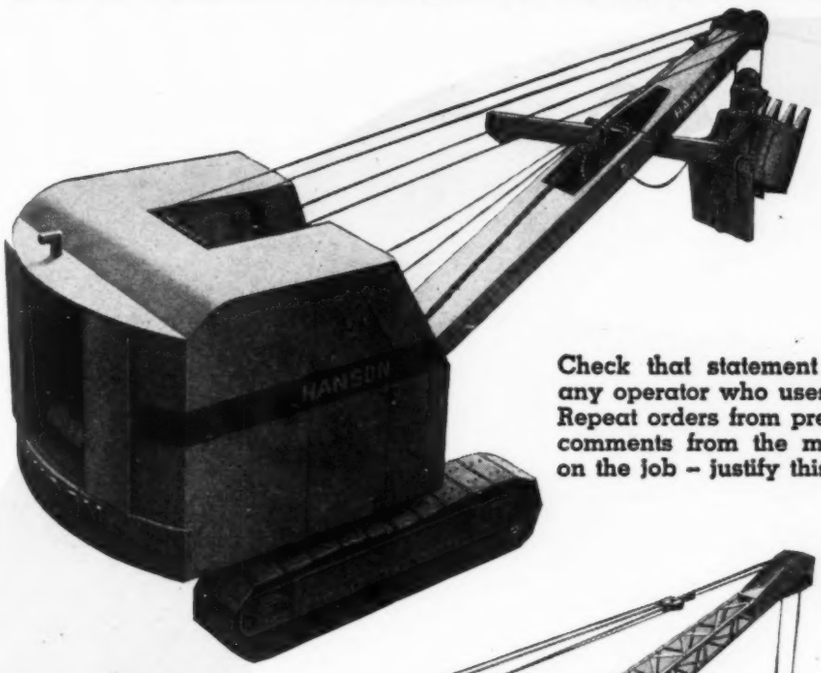
Pat. No. 2,380,275
April 12, 1942

Heavy duty lights that won't shake apart. Water can't get in and short them. Mounted anywhere on vehicle. Supplied with 6½ inch red lenses lettered "STOP" or with plain red, amber or blue lenses, for 6 and 12 volt systems.

KEYSTONE *FLASHING* LIGHT

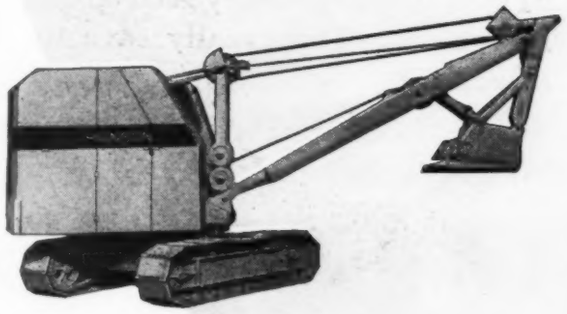
"The Lighthouse of the Highway"

YOU GET MORE WORK DONE..with a HANSON



Check that statement against the record. Ask any operator who uses one of the new Hansons. Repeat orders from present users and unsolicited comments from the men who pull the levers – on the job – justify this claim.

Two sizes: Model 31 - ⅜ cu. yd. as shovel or 4½ tons as crane.
Model 41 - ½ cu. yd. as shovel or 6½ tons as crane.
Basic unit easily and quickly converted in the field to shovel, trench-hoe, crane, clamshell or drag-line.



FEATURES: Full revolving . . . chain crowd . . . fully enclosed steel cab . . . welded steel construction . . . ball or roller bearings at all vital points . . . air controlled steering . . . disc type clutches on swing . . . internal expansion, booster type clutches on hoist and crowd . . . all clutches easily and quickly relined without removing shaft assemblies . . . extra long crawlers . . . heavy duty industrial type motor . . . gasoline or diesel.

Write for detailed specifications, catalog RS-248

HANSON CLUTCH AND MACHINERY COMPANY TIFFIN, OHIO

DW 10s SHINE

on this ZONED EQUIPMENT★ job

WORKING on an important section of U. S. Highway 52, between Cincinnati and Portsmouth, Ohio, Fuller-Davies Co. is using an all-"Caterpillar" line-up to speed construction and keep down costs.

The machines on the job include four "Caterpillar" Diesel D8 Tractors for pulling and push-loading scrapers; two D7s, equipped with bulldozers and sheepsfoot rollers; two "Caterpillar" Diesel DW10 Tractors, rolling fast on rubber, to handle the longer hauls; and a No. 12 Motor Grader to maintain haul-roads and do the finishing.

That's the kind of well-balanced team that many contractors have found unbeatable for giving them "lowest costs on earth."

Superintendent E. W. Redman likes the whole set-up, and he is especially enthusiastic about the job done by the wheel-type tractors. As he puts it: "These DW10s are very good on the long hauls. They really save us money."

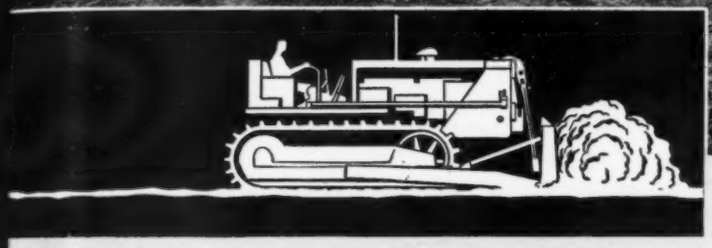
CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR

REG. U. S. PAT. OFF.

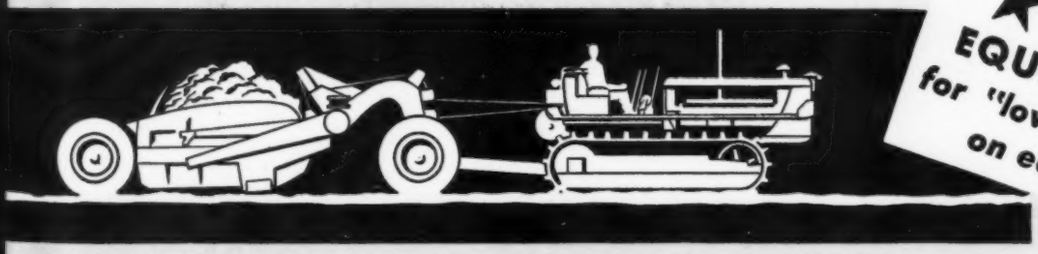
DIESEL

ENGINES • TRACTORS
MOTOR GRADERS
EARTHMOVING EQUIPMENT



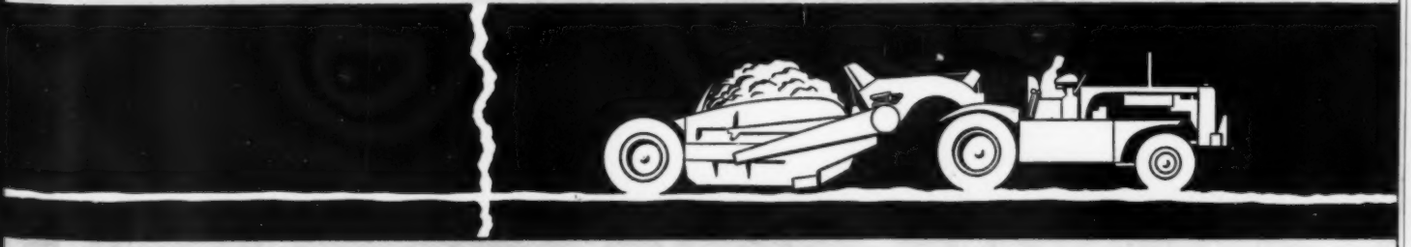
"Caterpillar" Diesel DW10 Tractors pull scrapers carrying earth to the fill on U. S. Highway 52, west of Portsmouth, O. *(The standard model DW10 Tractor is priced, without scraper, at $8830, F.O.B. Peoria, subject to change without notice.)*

ZONE 1. "Caterpillar" Diesel Track-type Tractors Equipped With Bulldozers and Rippers



★ ZONED EQUIPMENT for "lowest costs on earth"

ZONE 2. "Caterpillar" Diesel Track-type Tractors for Loading and Pulling Scrapers



ZONE 3. "Caterpillar" Diesel Wheel-type Tractors for High Speed on Long Hauls

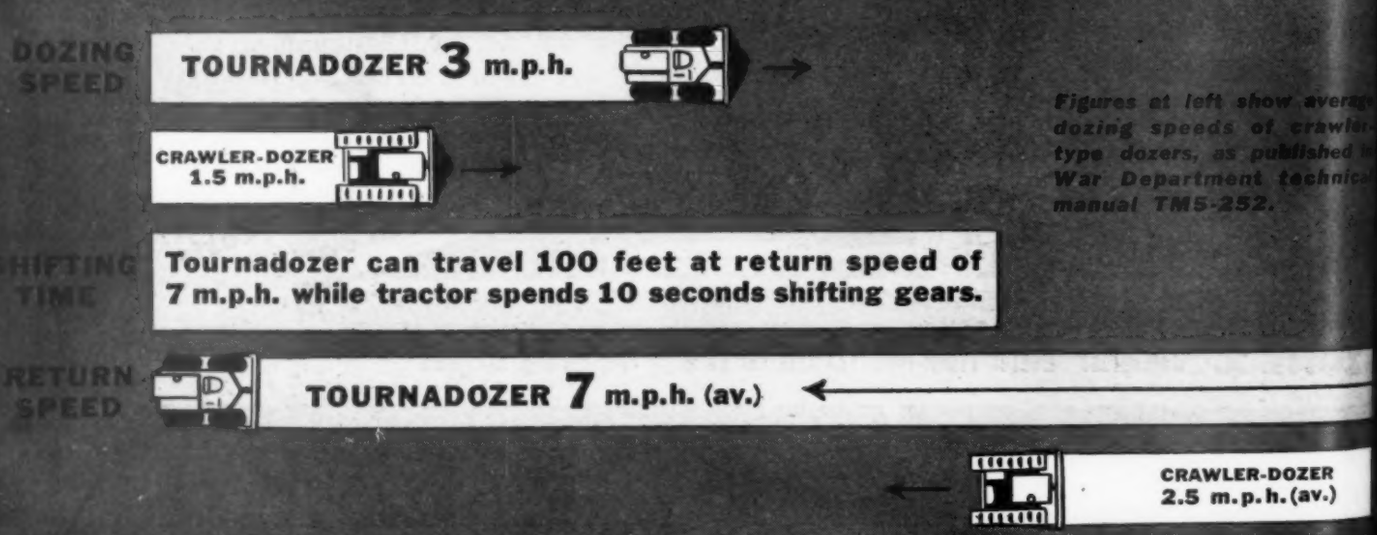
High Speed TOURNADOZER G

Faster Dozing C

Compare cycle time ... figure production

TOURNADOZER gives you double the average dozing speed forward . . . three times more speed in reverse. In addition, instantaneous speed selection saves up to 10 seconds every time you shift gears. Big rubber tires and 15 m.p.h. top speed get Tournadozer anywhere on your job in a hurry. Fast, self-powered job-to-job moves over pavement reduce your non-productive move time . . . eliminate expensive hauling and planking charges. Tournadozer enables you to get more work done at lowest net cost. Mail coupon at right for complete facts. **DO IT NOW!**

Increased speed plus instantaneous shi


DOZING SPEED
TOURNADOZER 3 m.p.h.
CRAWLER-DOZER 1.5 m.p.h.
SHIFTING TIME
Tournadozer can travel 100 feet at return speed of 7 m.p.h. while tractor spends 10 seconds shifting gears.
RETURN SPEED
TOURNADOZER 7 m.p.h. (av.)
CRAWLER-DOZER 2.5 m.p.h. (av.)

Figures at left show average dozing speeds of crawler-type dozers, as published in War Department technical manual TM5-252.

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See your Le Tourneau Distributor NOW for complete information

LET

Gives You Cycles

CLIP AND MAIL TODAY

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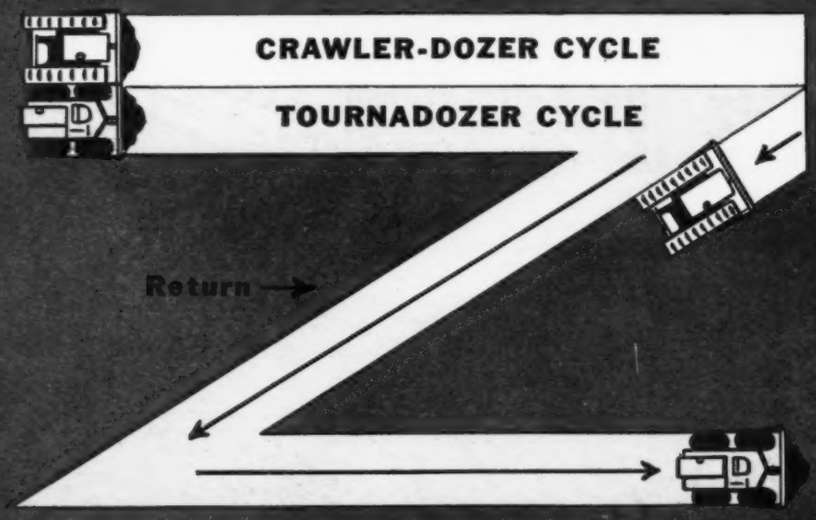
Tournadozer—Trademark R127

shift cut non-productive dozer time



Tournadozers' instantaneous speed selection permits faster travel after blade is full . . . immediate directional changes . . . faster dozing cycles.

LETOURNEAU PEORIA, ILLINOIS — HIGH-SPEED RUBBER-TIRED — TOURNADOZERS

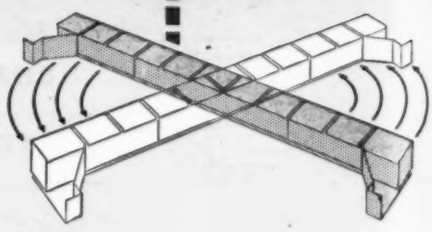
JAEGER announces the TYPE "X"

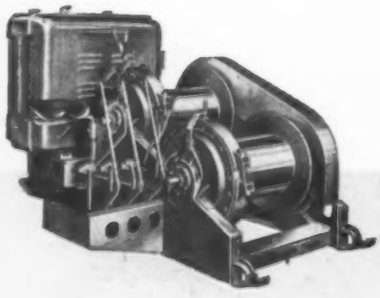
a revolutionary mass-production, labor-saving

Front screed is transverse,

Rear screed is diagonal:

Hand wheel, on operator's platform, quickly swings pivoted screed in either direction to whatever angle best suits the work.





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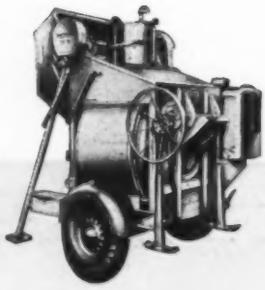
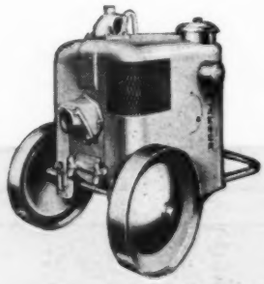
Low-geared for power or high-geared for speed by shifting a lever on automotive transmission. Hydraulic finger-tip control. 29 to 100 hp; gas or electric.



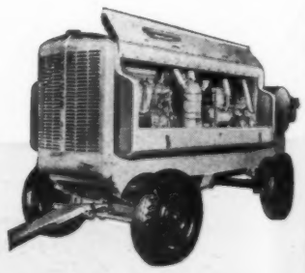
"SPEEDLINE" MIXERS

Fast loading, thoro mixing, fast discharging; speedy trailing. Machined steel drum tracks, automotive transmission. Sizes 3½S, 6S, 11S and 16S.



"SURE PRIME" PUMPS

Built and powered beyond their guaranteed performance. Portable units in 1½" to 10" sizes, up to 240,000 gph capacity; gas, diesel, electric. Also jetting pumps.



"AIR PLUS" COMPRESSORS

Jaeger-engineered and micro-precision built to deliver more and cooler air per pound of fuel. All sizes, 60 to 600 cu. ft. — gas, diesel, electric.

DIAGONAL SCREED FINISHER

tool to work with modern mass-production pavers

faster, more accurate than any transverse finisher . . . finishes flush to higher form when slab is pitched or super-elevated . . . saves up to 2 men on carry-back, requires less hand work and equipment behind the finisher

SOLVES PROBLEM OF FINISHING PITCHED SLAB AND CURVE ELEVATIONS

A true power trowel — where slab is pitched you simply set the rear screed at whatever angle is needed to carry the material uphill and compact it solidly against the upper form. Eliminates or greatly reduces carryback, especially with stiff material; you save one to two shovelers' wages on every job.

MORE ACCURATE THAN ANY TRANSVERSE FINISHER

Because the rear screed operates diagonally to the front screed, it always meets the material at a different point. High spots left by the front screed are sliced off, low spots are filled in, producing a smoother surface than is possible with any one-direction finisher and with less hand work and equipment needed behind the machine.

GREATER CAPACITY TO MATCH ANY PAVER

Because the rear screed works at an angle against the final roll of material and at a wide range of speeds, *all independent of traction*, stiff mixes are more easily finished without tearing. Helps to eliminate extra passes, easily keeps pace with dual drum pavers on half-width as well as full-width slab.

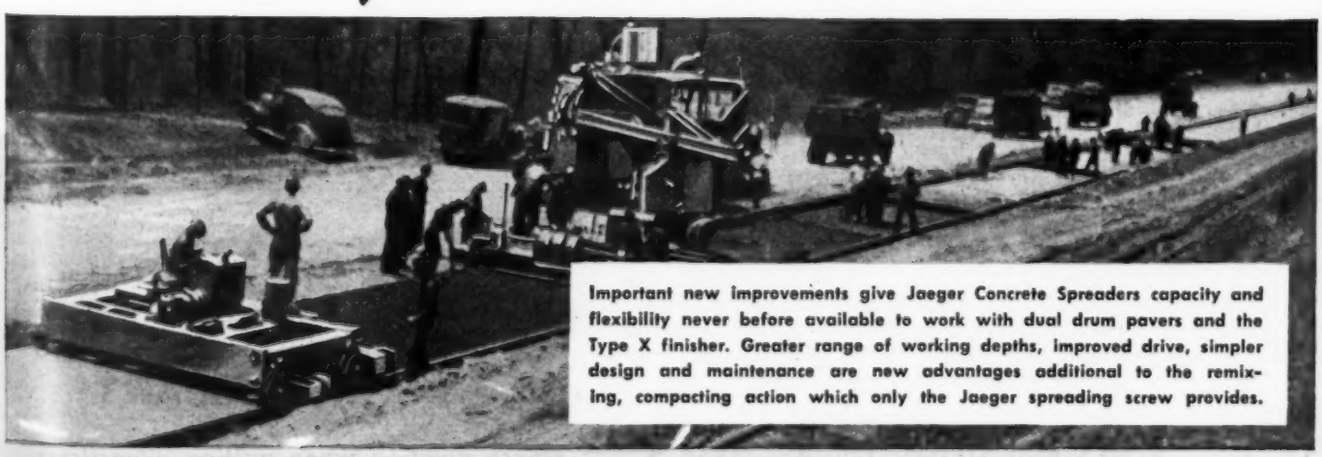
JOB-TESTED FOR 18 MONTHS — NOW AVAILABLE FOR 1948 WORK

10-15 and 20-25 ft. widths with quick crown change screeds standard. See your Jaeger distributor immediately or write for Specification FX-8 giving complete details of the Diagonal Screed Finisher.

THE JAEGER MACHINE CO., Columbus 16, Ohio

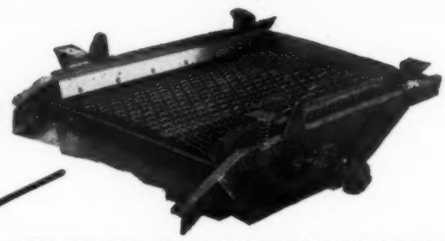
Regional Offices: 1504 Widener Bldg., Philadelphia. • 226 N. La Salle St., Chicago 1, Ill. • 235 American life Bldg., Birmingham 1, Ala.

JAEGER *Engineered* EQUIPMENT



Important new improvements give Jaeger Concrete Spreaders capacity and flexibility never before available to work with dual drum pavers and the Type X finisher. Greater range of working depths, improved drive, simpler design and maintenance are new advantages additional to the remixing, compacting action which only the Jaeger spreading screw provides.

Re-mixing, Compacting Spreaders of increased capacity for mass-production paving



THE PIONEER BUZZER is a small, compact screen that attaches to the delivery end of a conveyor. 18 square feet of live wire screen produce about 50 tons of material an hour.

New
Low-cost
Continuflo
GRAVEL PLANT

MAKES SMALL JOBS PROFITABLE

● Here's a new portable screening and loading plant that *makes small jobs profitable*. As units they're...

The Pioneer Buzzer Screen
The Pioneer Hydraulic Conveyor Truck
with Conveyor and Feeder

Together, they're one of the sweetest portable screening and loading plants you've ever seen. Hauled behind a truck, set up anywhere in twenty minutes, produce as much as 500 tons of specification gravel in a day.

Want more information about this profitable pair? Then, write today for complete details about Pioneer's new Buzzer Screen and the Hydraulic Conveyor Truck.

PIONEER ENGINEERING WORKS
1515 CENTRAL AVENUE • MINNEAPOLIS, MINNESOTA

IN NINE MINUTES, one man can easily elevate a 50' conveyor with this new Pioneer Hydraulic Conveyor Truck. A twist of a valve and it's back in its cradle... ready for another move. Handles conveyors up to 50' in length with belts as wide as 30". A reciprocating plate feeder mounted on the conveyor completes the plant.

BUY BOTH!
Higher Output,
Lower Upkeep!

Pioneer
Continuflo **EQUIPMENT**

Running check for over 20 years

THE DRIVERS of every car and truck make their own check of roads built with Ohio Oil Company Asphalts. And their approval is double-checked by Midwest contractors and public officials who have seen how Ohio Oil Asphalts maintain consistent records for long life, economy and minimum repairs.

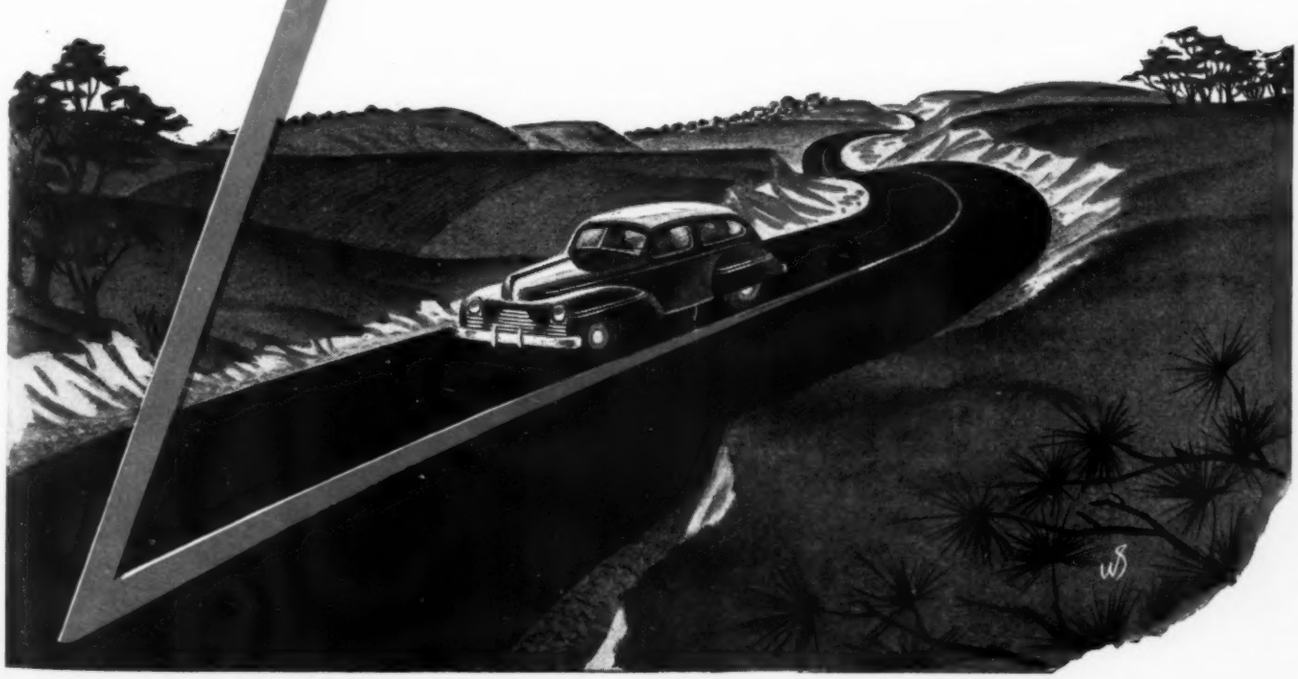
The Ohio Oil Company manufactures a complete line of all grades of rapid, medium and slow-curing asphalts and asphalt cements.

OHIO OIL COMPANY ASPHALTS

The Ohio Oil Company • Asphalt Department

ROBINSON, ILLINOIS • LOVELL, WYOMING

Producers of Petroleum since 1887



America's Most Powerfu

Get the Benefit of These Features

Greater Power—180 H.P. at the flywheel, 167 Belt Horsepower and 140 Drawbar Horsepower. Unmatched by any other crawler!

Higher Speed—The TD-24 is built for high speed operation as well as for tremendous pull.

"Planet-Power Steering" means greater drawbar pull on turns—power on both tracks! Also pivots easily!

Hydraulic "Finger-tip Control"—relieves operator of work in maneuvering this agile giant. Provides instant High-Low Range shift.

Quick Reverse Shift—bypasses speed change gears to permit instant forward-to-reverse and reverse-to-forward shift.

Synchromesh Transmission—permits shifting "On the Go"!

8 Speeds Forward and 8 Speeds Reverse—provides correct gear for each load condition.

THIS new, versatile giant of power and pull now rolls off the production line at International Harvester's mammoth Melrose Park Works. It is America's *most powerful* and *easiest to operate* crawler. It cannot be beat for work capacity!

See your International Industrial Power Distributor soon and get the whole story, including specifications and delivery data, on this new Diesel tractor. When you put the TD-24 to work on your jobs, watch your earth-moving costs drop.

Industrial Power Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue • Chicago 1, Illinois

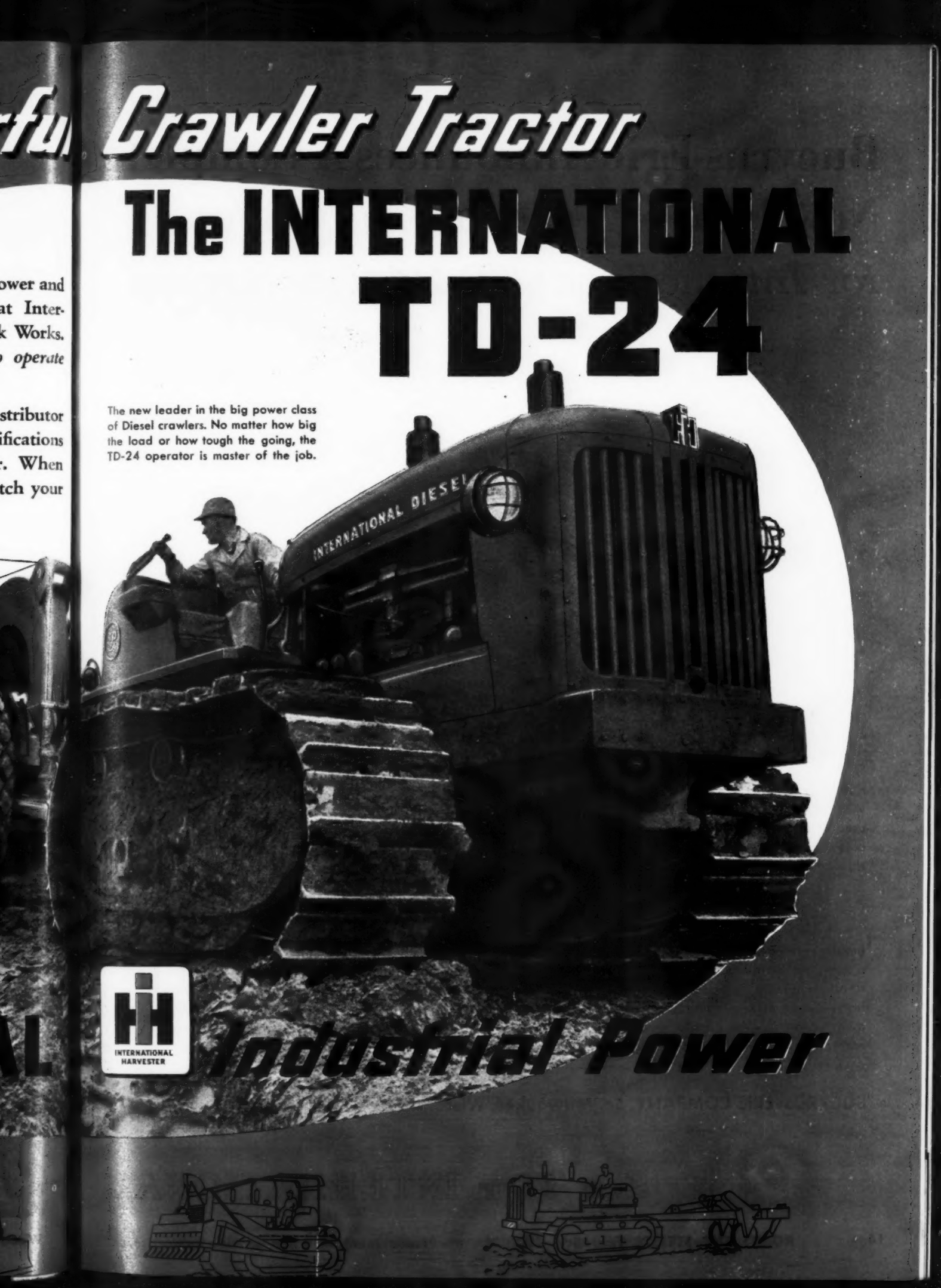
CRAWLER TRACTORS
POWER UNITS
DIESEL ENGINES
WHEEL TRACTORS

INTERNATIONAL

rful Crawler Tractor

The INTERNATIONAL TD-24

The new leader in the big power class of Diesel crawlers. No matter how big the load or how tough the going, the TD-24 operator is master of the job.



INTERNATIONAL HARVESTER

Industrial Power

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Bucyrus-Erie Announces A Complete New Line of Tractor Equipment *for International TD-24 Tractors*

BULLDOZERS

Sturdily built, thoroughly field-tested with the tractor. Highly wear-resistant alloy steel blade, reinforced for hard digging, curved to keep dirt rolling. Reversible cutting edge. Box-section push arms, with vertical diagonal braces strongly welded to blade. Simple, effective cable control. Combination of castings and weldments for strength and durability. Easy to apply to the tractor.

BULLGRADERS

Unusual visibility for accuracy, efficiency and safety of control. Tilting and angling adjustments for increased versatility. Manganese steel blade of high tensile strength. Reversible cutting edge. Replaceable cast steel corner shoes. Loads and thrusts placed to make most efficient use of tractor power. Cable controlled, with large sheaves placed well out of the way of dirt . . . simple cable reeving.

SCRAPERS

Four-wheel scrapers of 13.5 and 22 cubic yards struck measure capacity. Low center of gravity and wide-spread rear wheels furnish outstanding stability. Exclusive double-curve cutting edge . . . loads more uniformly with less horsepower. Positive rolling ejection takes less power . . . permits dumping and spreading in higher gear. Hinged, two-part apron on 22-yard scraper provides exceptionally wide opening for handling sticky or bulky materials. Can also be used as conventional single-piece apron . . . changeover requires only a few minutes. Main frame sides protected from wear by alloy steel side cutters bolted to side frames. Cutters are reversible for longer life.

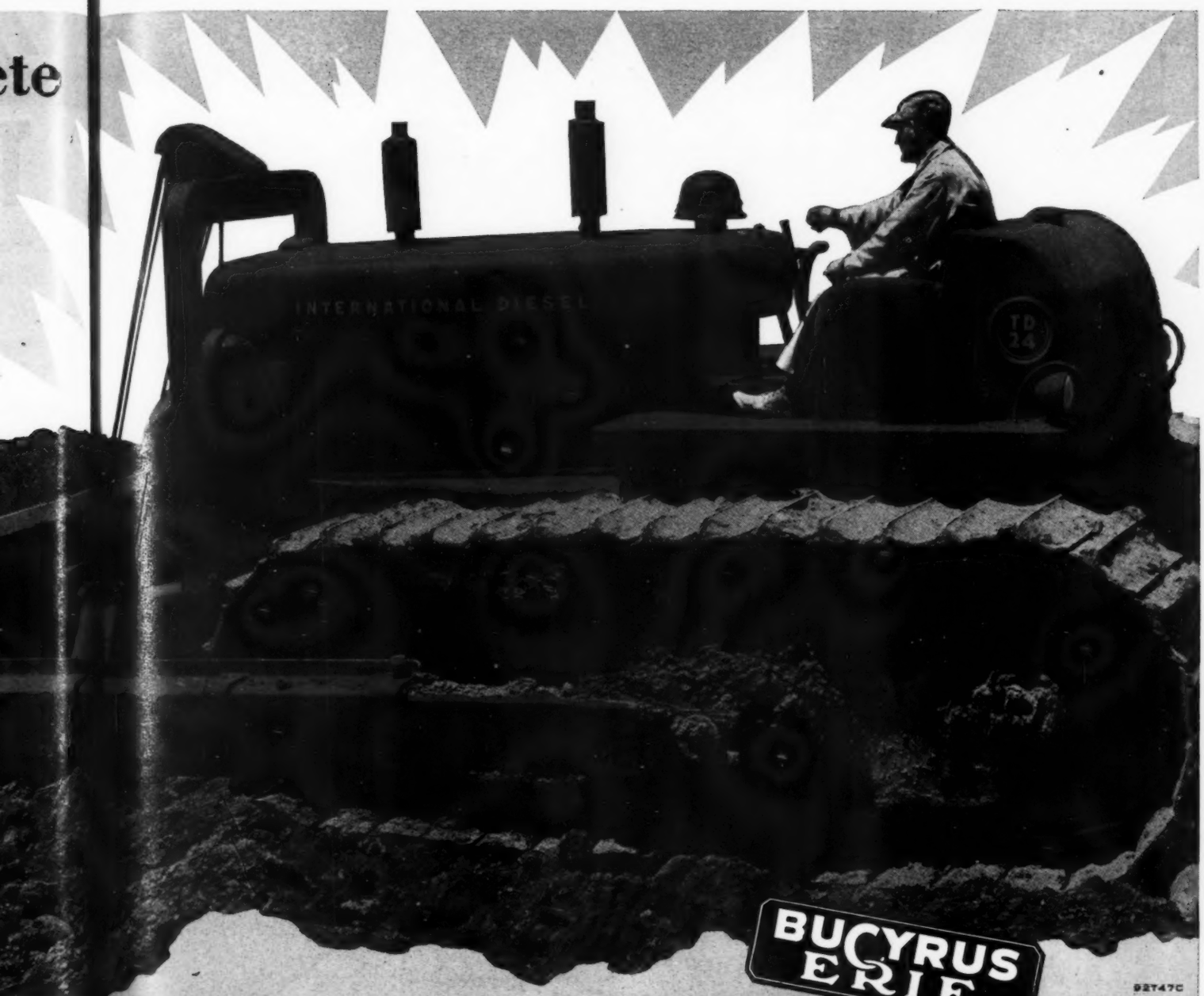
Power Control Winches

Front-mounted single drum winch for use with bullgrader or bulldozer blade. Rear-mounted double drum winch for blade and scraper combinations. Planetary drive . . . constant live power instantly available. Low hand lever loads — conveniently located controls. Cool-running . . . interchangeable bands . . . single adjustment takes up all planetary main bearings. Band adjustments are easy to make, long lasting. Cushioned action is easy on cable, tractor and equipment.

BUCYRUS-ERIE COMPANY, So. Milwaukee, Wisconsin

Scientifically curved Bullgrader blade keeps dirt on the move.

See Your INTERNATIONAL



BUCYRUS ERIE

92T47C

The B-250 scraper has 22 cu. yds. struck capacity. Hinged apron provides greater opening.

WINCHES: Left: Front-mounted single drum winch. Right: Rear-mounted double drum winch.

INDUSTRIAL TRACTOR DISTRIBUTOR

PROVED ON THE JOB

with the new TD-24 . . Greater utility, longer life, and top performance for both tractor and equipment are facts, not theories . . . The Complete Isaacson Line has the strength for International's new super-tractor . . . Super work-ability to match super horsepower . . . A new high in equipment efficiency to match a new high in tractor performance.

The Isaacson Line is complete for the new TD-24, as it is for all International models . . Kable Trac-Dozers . . Hydraulic Trac-Dozers . . Karry-Skrapers . . Super-Rooters . . Klearing Blades . . Winchoists . . Kable Power Units . . Fas-Tamp Rollers.

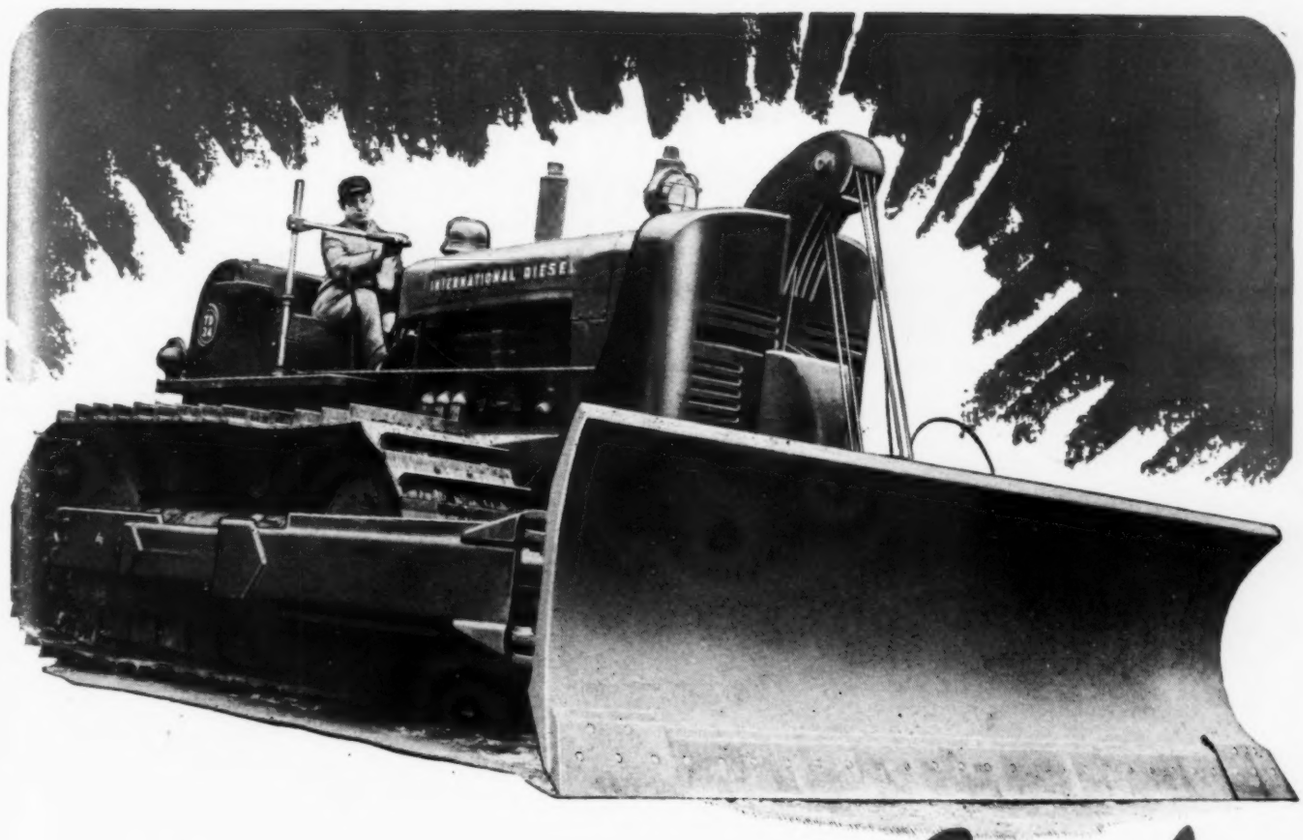
"Engineered For Balance"

SOLD AND SERVICED BY INTERNATIONAL INDUSTRIAL POWER DISTRIBUTORS ALL OVER THE WORLD

ISAACSON

Tractor Equipment

A PRODUCT OF THE ISAACSON IRON WORKS · ROCKFORD, ILLINOIS · SEATTLE, WASHINGTON



Standardize on Stamina

. . . with dependable HEIL matched equipment for the International TD-24 — *America's most powerful crawler*

You can be sure of profit-making yardage when you standardize on perfectly-matched HEIL equipment for International Crawlers. This ideal combination moves big pay loads faster and at lower cost than ever before. Look at the Heil line-up:

Bulldozers with scientific load-carrying contour, long-life reversible edges, and sturdy box-section construction.

Trailbuilders with the rugged A-frame that assures unusual stamina, and easy blade-angle adjustment.

Scrapers built for fast, bonus loading and controlled dumping. Open-top construction gives them double use as dump wagons, whenever you have need for such units.

This Heil line-up of earthmoving equipment is all skillfully designed to match America's most powerful crawler — the International TD-24, and the full line of International Crawler tractors as well.

Let your International Industrial Power Distributor show you why you standardize on stamina when you specify Heil equipment for International Crawlers. Here's a team that pays off in larger earthmoving profits.

THE HEIL CO.

GENERAL OFFICES • MILWAUKEE 1, WISCONSIN

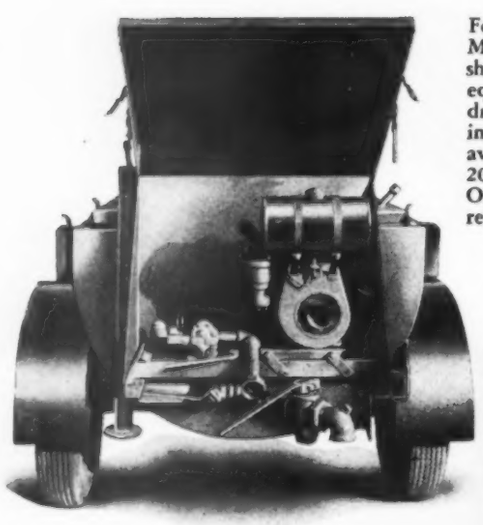
R-98

You save earthmoving time and money with Heil equipment . . .

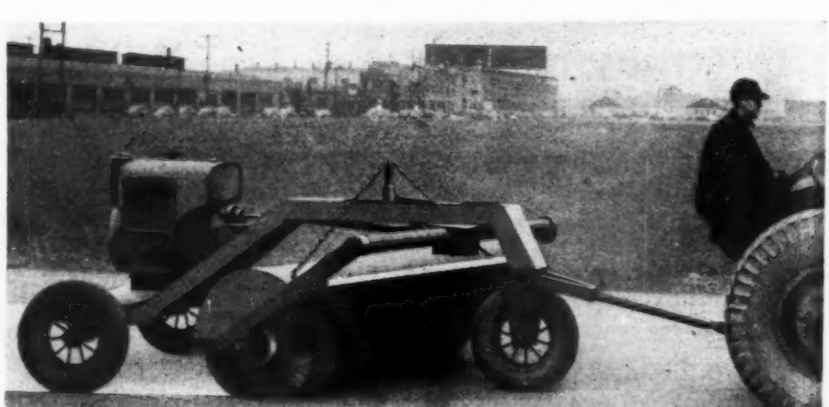
ASPHALT EQUIPMENT That Lowers Your CONSTRUCTION AND MAINTENANCE COSTS

The Model SJ equipped with a 100 G.P.M. Pump, powered by a 7.2 h.p. engine, will handle any type of material through spray bar lengths up to 10 feet. Two powerful burners pour heat through 5 inch heat flues—assures fast heating. Single lever controls all operations—spraying shoulders, relocating curves, hand spray, seal coating, patching chuck holes, or crack filling.

Model 957 Pressure Distributor shown above will handle all types of primary black top construction. Equipped with 350 G.P.M. Pump, 27 h.p. engine and completely full circulating spray bar.



For faster patching, the Model "S" Tar Kettle shown at the left is equipped with motor driven 10 G.P.M. pumping. Model S Kettle is available in 80, 110, 165, 200 and 350 gallon sizes. One man can operate—reduce labor costs.



The pull type construction and maintenance engine driven broom (also available in traction driven), shown ----- reduces cleaning costs. Broom suspended so that it is pulled into the road bed rather than pushed. Results in longer broom wear—lower replacement costs.

There is a dealer in your immediate territory. Write for details today.

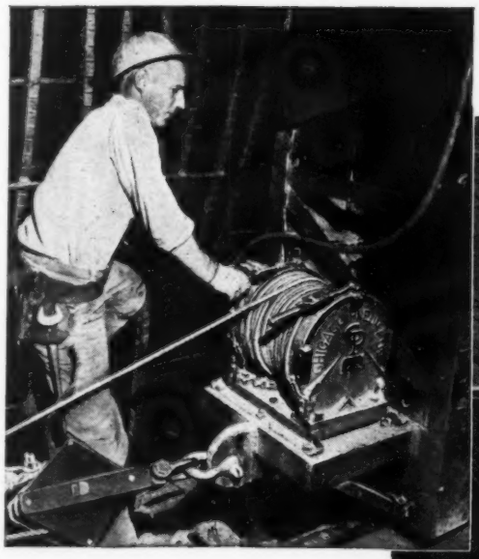
Built to the Highest

Standard

OTHER PRODUCTS:
ASPHALT DISTRIBUTORS • TAR KETTLES • MAINTENANCE DISTRIBUTORS • BURNERS STREET FLUSHERS • SPRAY UNITS • SUPPLY TANKS SURFACE HEATERS • SHOULDER ROLLERS . . . and Agricultural Equipment.

Standard Steel Works NORTH KANSAS CITY, MO., U.S.A.

30-ton Steel Form moved by CP Utility Winches



On the Columbia River Basin Project two huge concrete siphons are under construction. The reinforced concrete shell, 25 feet in diameter, two feet thick, is poured in a 60,000-pound movable steel form which straddles the siphon and runs on tracks. Two CP Air Winches pull the form from section to section, spotting it accurately at each location.

Powered with air, electric or gasoline motors, CP Utility Winches have a wide range of applications – single or multiple line hoisting . . . spotting cars . . . handling timber . . . erecting machines, boilers, structural steel, etc.

Precision control of the CP Utility Winch is provided through clutch and brake levers. The clutch lever enables the operator to vary drum speed, and "tease" the load by hauling it in, holding it momentarily or paying it out. To increase the versatility of the CP Utility Winch, a combination cathead and drum arrangement can be furnished. Write for Bulletin SP-2057.

Whenever air demand slackens, the engine speed of fuel-thrifty CP Portable Compressors is correspondingly reduced by automatic action of the CP Gradual Speed Regulator. This and other CP features effect fuel savings of 15% to 35%.

CP gasoline-driven compressors range in capacity from 60 to 315 c.f.m.; Diesel-driven from 105 to 500 c.f.m. Write for complete information.

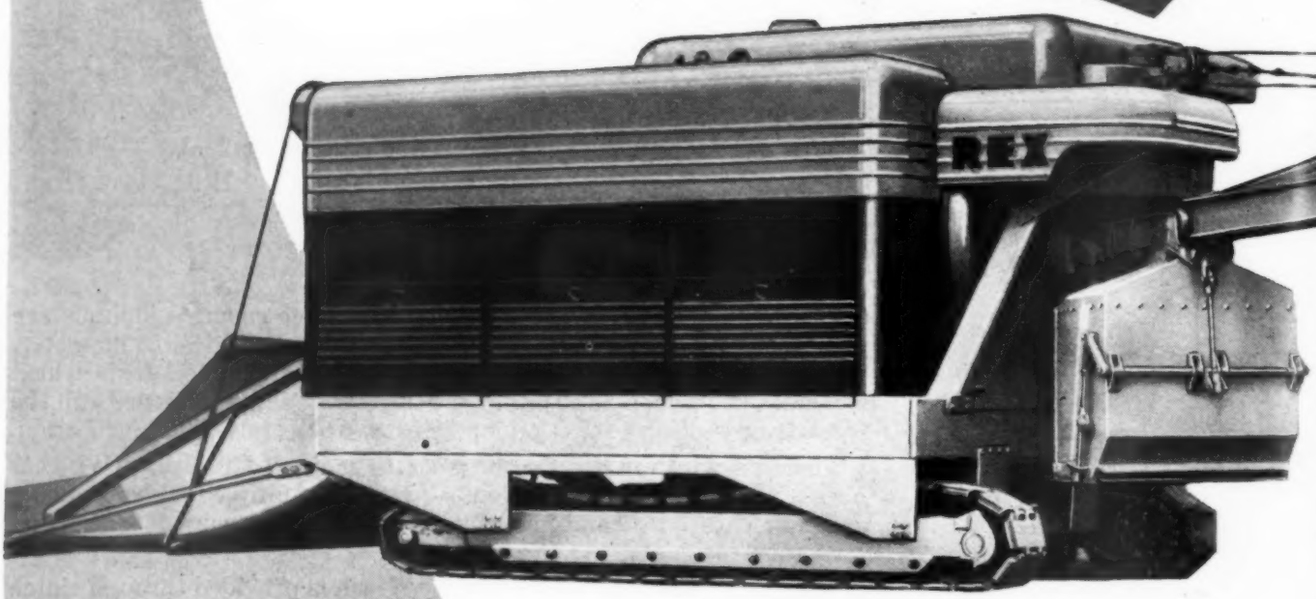
CHICAGO PNEUMATIC TOOL COMPANY

General Offices: 8 East 44th Street, New York 17, N. Y.

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

the new

as new inside



● 34E SINGLE AND
DOUBLE DRUM PAVERS

CHAIN BELT
REX
COMPANY

Rex Pavers

...as they are out!

● Before you spend your money for a paver for the big road program ahead, check the only basically new pavers in the industry. Rex Pavers are new *inside and out*... from the ground up... field-tested and proved by 4 years of actual experience in the roughest, toughest kind of high speed production. Just look over the new advantages Rex will give you:

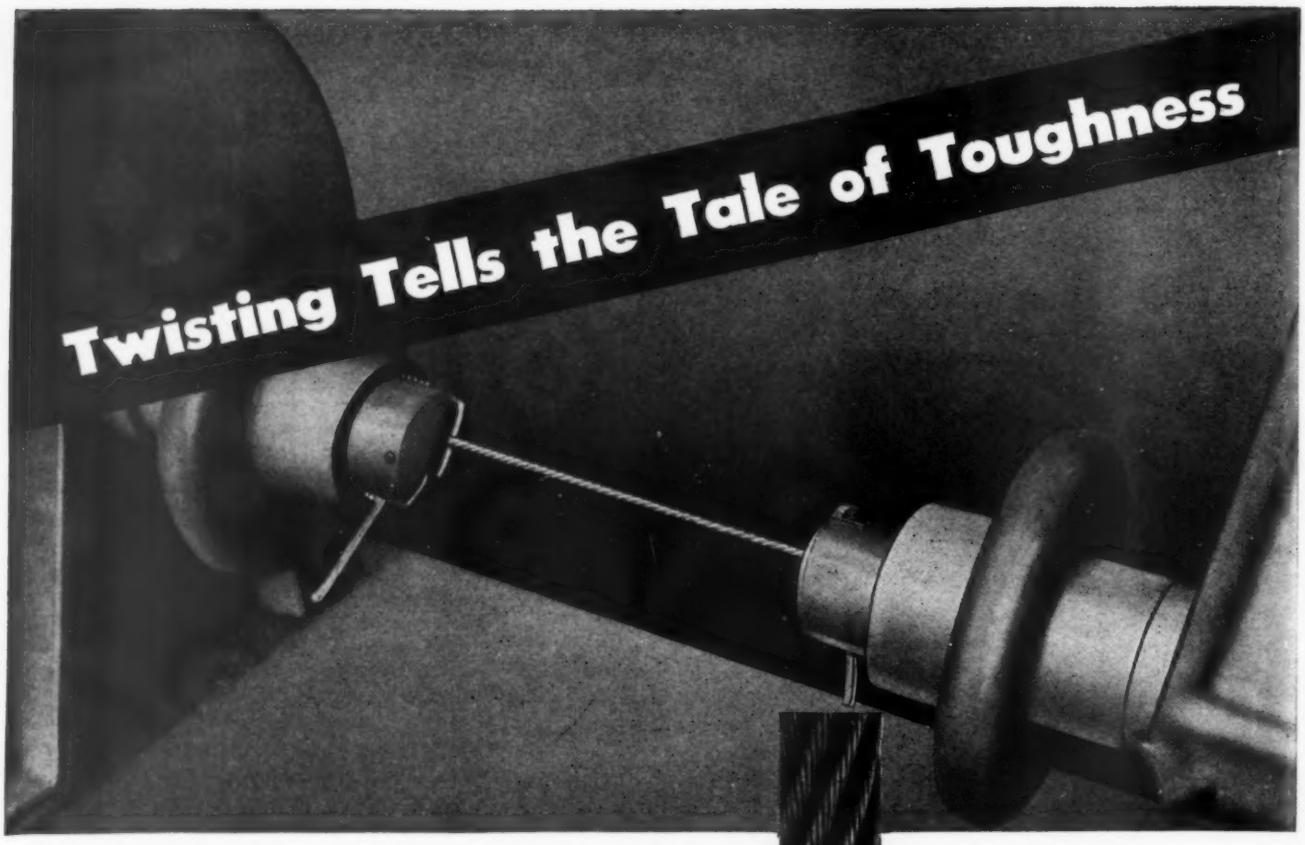
NEW ACCESSIBILITY. The new streamlined shielding makes these the most accessible pavers you've ever seen. Big, easy-opening doors permit quick access for lubrication and inspection. And streamlining keeps dirt off the working parts ... assures less clean-up time, lower maintenance, longer life.

NEW HYDROCYCLE CONTROL. Here's the greatest advance ever made in paving speed and ease of operation. This foolproof cycle control combines batchmeter and automatic cycle operation in one unit. It eliminates those costly wasted seconds... assures exact timing. All the operator does is give the control a gentle push and Hydrocycle takes over ... operates the charging, batch transfer, discharging and water control. And, at any time he can cut into the cycle and take over operation by hand.

NEW OPERATOR COMFORT. With the new Rex Pavers, the operator never has to leave his comfortable seat. With Hydrocycle, the roomy, clear vision deck, and the grouped controls, he can keep the paver going at top speed all day long with far less effort.

AND NEW simplicity of design, new rugged construction, new ease of spreading, new type crawlers... there's a whole host of new features it will pay you to check. For all the facts, see your Rex Distributor or write Chain Belt Company, 1685 W. Bruce St., Milwaukee 4, Wis.

CONSTRUCTION MACHINERY



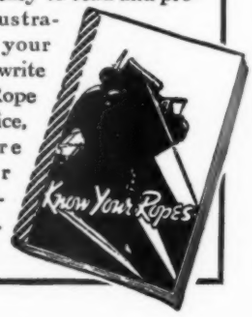
Here we see an 8" piece of rope wire being twisted on its own axis. The revolutions necessary to break the wire are counted and only those coils are accepted which test at least 10% above American Petroleum Institute specifications for wire rope. In addition to being an indication for toughness, the torsion test reveals whether the wire is free from steel defects such as seams and cups.

A routine test? Yes, but with higher standards. And every coil of wire on both ends must pass this and countless other tough tests before acceptance for use in making Wickwire Rope. It's these tests, coupled with over 125 years of wire-working know-how, that are your assurance of the utmost in performance, safety and long rope life when you use Wickwire Rope.

Wickwire Distributors and Wire Rope engineers throughout the country are ready to help solve your wire rope problems, and to provide prompt delivery of the rope you need from strategically located warehouse stocks. Wickwire Rope is available in all sizes and constructions, both regular lay and WISSCOLAY *Pre*formed.

THIS 82-PAGE BOOK ON WIRE ROPE IS FREE. WRITE FOR YOUR COPY TODAY!

Thousands of wire rope users have found that the information packed in the pages of "Know Your Ropes" has made their work easier. It's full of suggestions on proper selection, application and usage of wire rope. It's easy-to-read and profusely illustrated. For your free copy, write —Wire Rope Sales Office, Wickwire Spencer Steel, Palmer, Mass.



WICKWIRE ROPE

CF&I & SUBSIDIARIES

A PRODUCT OF THE WICKWIRE SPENCER STEEL DIVISION OF THE COLORADO FUEL AND IRON CORPORATION

WIRE ROPE SALES OFFICE AND PLANT—Palmer, Mass. **EXECUTIVE OFFICE**—500 Fifth Avenue, New York 18, N. Y.

SALES OFFICES—Abilene (Tex.) • Boston • Buffalo • Chattanooga • Chicago • Denver • Detroit • Emlenton (Pa.) • Fort Worth • Houston • New York • Philadelphia • Tulsa

PACIFIC COAST SUBSIDIARY—The California Wire Cloth Corporation, Oakland 6, California

CHECK these BLACK TOP PAVER ADVANTAGES BEFORE YOU BUY!

- **Hydraulic Controls** — for easy handling
- **Continuous Course Correction**— corrects irregularities with successive courses
- **Powerful Six Cylinder Engine**— power to handle the heaviest truck
- **Four Wheel Drive**
- **Cutter Bar**—overlaps and compacts joint—"crowds" and compacts materials
- **Power Cut-Off**—permits carrying load over intersections and eliminates tag-end run-outs
- **End Gates**—permit feeding material out to sides with cutter bar extension
- **Screed Heater**—assures better handling of material
- **Crowning Adjustment**—for any crown or bank
- **Either Rear Roller**—can be disengaged for quick turning
- **Hopper**—big . . . adjustable . . . for narrow pavements
- **Sturdy, Heavy Construction**—that stands the strain of work without constant rebuilding
- **Adnun Carryall**—easily attached . . . makes moving up on jobs easy

Builders of
Adnun Black Top Pavers, MultiFoote Concrete Pavers and Foote Kinetic Mixers

Adnun Black Top Pavers have proved themselves on highway work. They bring a combination of advantages that can't be found in any other black top paver on the market. These advantages mean faster laying, smoother pavement and less time cost in moving from one part of the job to another. Check these advantages before you buy and be sure you are getting the most for your money. Let us send you the latest Adnun Catalog.

THE FOOTE COMPANY, INC.
1936 State Street • Nunda, New York

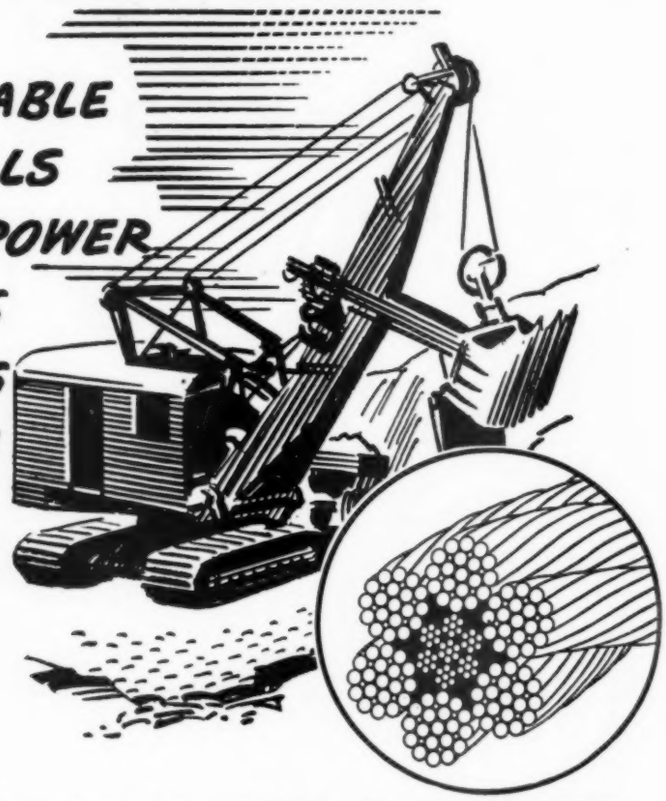
ADNUN
TRADE MARK REGISTERED
BLACK TOP PAVER

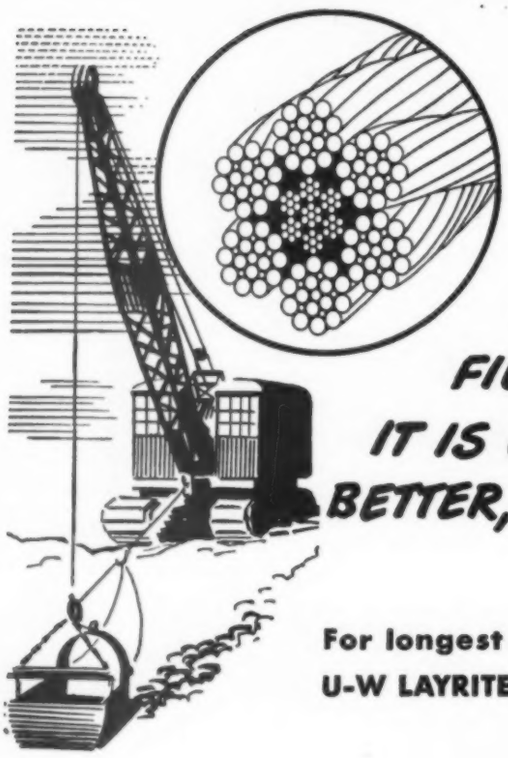
MULTIFOOTE CONCRETE PAVERS

SOME ROPES FOOL YOU

U-W 6×19 FILLER WIRE CABLE IS IDEAL FOR BOOM FALLS AND HOIST ROPES ON POWER SHOVELS BECAUSE IT IS FLEXIBLE AND RESISTS FATIGUE AND ABRASION

BUT...





FOR DRAG CABLES ON DRAG LINE EXCAVATORS, U-W 6×16 FILLER WIRE IS BETTER BECAUSE IT IS COARSE AND RESISTS ABRASION BETTER, YET IS SUFFICIENTLY FLEXIBLE

For longest and best service, always specify U-W LAYRITE (*Preformed*) IMPROVED PLOW STEEL

We invite you to let UPSON-WALTON engineer your tough rope jobs.

Copyright 1947—The Upson-Walton Company

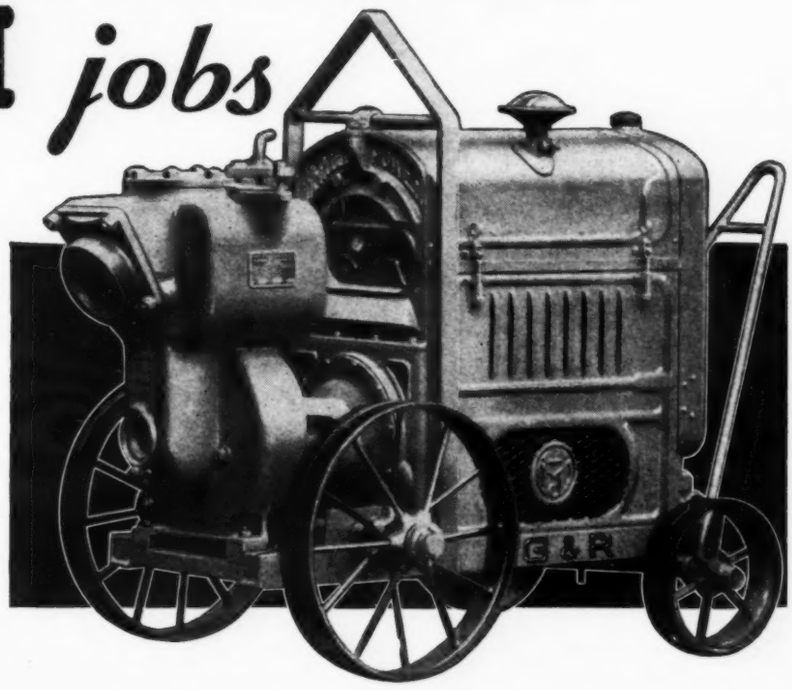
THE UPSON-WALTON COMPANY

Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks, Brattice Cloth

Main Offices and Factory: Cleveland 13, Ohio

114 Broad Street, New York 4 — 737 W. Van Buren Street, Chicago 7 — 241 Oliver Building, Pittsburgh 22

TOUGH *pumps that will handle the* TOUGH *jobs*



Gorman-Rupp Heavy Duty Pumps are big, tough and dependable. The Pump pictured here is the Model 1602 (80M), capacity 1,500 GPM at average total head.

"HANDY" PUMP

A tiny pump weighing only 20 lbs., remarkable for performance. Fitted with pipe or common garden hose, this pump will lift up to 25 ft. Delivers 8 GPM at 40 lbs. pressure. Electric motor driven—self-priming. An extremely handy, dependable and trouble-free pump for all kinds of pumping jobs.

Pumps and other equipment used on construction work must take a lot of punishment. Gorman-Rupp centrifugal pumps can help you complete your contracts on time and at a greater profit. They will stay on the job day in and day out for months at a time if necessary with no costly loss of time for repairs.

Gorman-Rupp self-priming centrifugal pumps are by far the simplest pumps made and are streamlined inside where streamlining counts. They will handle any muck, weeds or gravel that will pass the intake strainer. Every part of a Gorman-Rupp pump has long wear built into it and every wearing part is easily and quickly replaced with common tools.

There is a Gorman-Rupp pump as small and handy as a bag of tools, capable of delivering 1,000 G. P.H. and there are other pumps with capacities up to 125,000 G. P. H.

Gorman-Rupp pumps will out-live and out-perform any other comparable equipment.

Write for further detailed information or call your nearest distributor.

THE GORMAN-RUPP COMPANY

GORMAN-RUPP PUMPS — UNSURPASSED FOR PUMPING FAST

323 N. BOWMAN STREET • MANSFIELD, OHIO

Why drill a pipe full of holes?

It does seem odd to drill holes in a pipe intended to carry water. But this is one sure way to cut highway maintenance, and provide greater safety the year around.

Even the best of pavements cannot hold up on a soft, soggy foundation. Budgets take a beating—safety takes a nose dive. The permanent cure is to install ARMCO Perforated Pipe. It picks up harmful groundwater and drains it away safely.

Installing ARMCO Pipe is easy and economical. The work moves fast with unskilled labor. Long, easily-handled lengths are quickly joined by sturdy band couplers. Shifting soils and severe frost action are no hazards. Your subdrainage system has *proved strength* to resist crushing, cracking or disjointing under the impact and weight of heavy loads. Continued efficiency is assured.

You'll like ARMCO Perforated Pipe for complete highway drainage systems or for taking care of trouble spots wherever they occur. Write for complete information. Armco Drainage & Metal Products, Inc., 1775 Curtis Street, Middletown, Ohio.

ARMCO

ARMCO PERFORATED PIPE

for lowest first cost...

and HIGHEST YARDAGE PER HOUR on your small earthmoving jobs

you can't beat LaPLANT-CHOATE

4-yd. hydraulic operated scrapers and high speed, rubber-tired industrial tractors . . . .

LaPlant-Choate 4-yd. scrapers have all the features for moving more dirt at less cost. Offset cutting edge and powerful hydraulic down pressure insure instant penetration in any type of material and 25% faster loading. Positive forced ejection means fast, accurate spreading. Modern design and low center of gravity provide maximum maneuverability and minimum maintenance and upkeep expense.

You can use these handy 4-yd. units with almost any type of industrial rubber-tired tractor with sufficient horsepower. They will pay for themselves and the tractor in a hurry and step up your profit range on an infinite variety of earthmoving jobs.

Ask your nearest LaPlant-Choate distributor for a copy of Bulletin A-1142-A for specifications. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; 1022 77th Avenue, Oakland 3, Calif.

COMPARE THE COST AND PRODUCTION

No. of Units	Approx. Cost Tractor & Scraper	*Production in Yds. Per Hour One Way Haul 200'	400'	600'	1000'	2000'
1	$ 6,500	69	55	50	44	32
2	13,000	138	110	100	88	64
3	19,500	207	165	150	132	96

*Production based on 50 minutes per hour operating efficiency, level loading, average working conditions and average material.

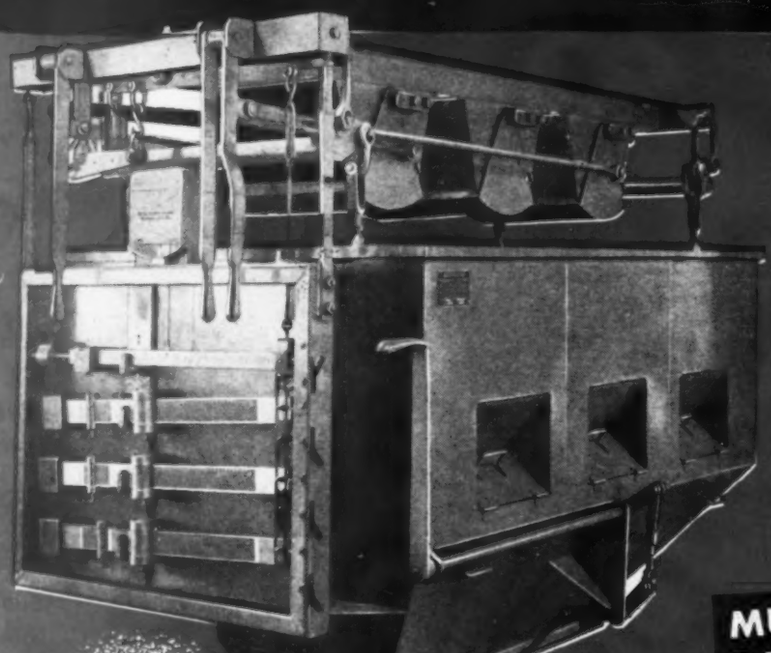
Easily converted for use with track-type tractors.

LaPLANT-CHOATE

HIGH SPEED EARTHMOVING EQUIPMENT

FOR LOWEST POSSIBLE COST PER YARD . . PER JOB . . PER YEAR

JOHNSON Roadbuilders'



- Completely Portable . . .
- Readily Attached to Bin . . .
- Quickly Convertible to Handle Extra Materials

MULTIPLE-MATERIAL BATCHER handles 2 or 3 materials

Below, Roadbuilders' Multiple-Material Batcher produces quality mix at high speed . . . is quickly dismantled when ready to move to new job location.

You'll like the flexibility of the Johnson Roadbuilders' Multiple-Aggregate Batcher. You save assembly time . . . batcher accurately fits Johnson bins . . . adaptors can be made to suit other similar bins. Overhead unit frame supports fill valves, hand levers, aggregate hopper and beam box . . . provides convenient reassembly and assures accurate alignment of scale parts. Like all Johnson Batchers, the Roadbuilders' units are famous for accuracy that produces top quality concrete with utmost economy in use of materials.

Built in two sizes — Size 34 for 34-E pavers and 1-yard mixers and Size 56 for pavers and truck mixer charging—this handy Roadbuilders' Multiple Batcher handles either two or three aggregates. The Two-Material Batcher is convertible in the field, to handle three materials, by simply adding one fill valve and one weight beam.

Sturdy, all-steel construction of hopper, electric welded throughout, gives you long, trouble-free service. Steep discharge angle empties hopper completely and fast. Discharge gates are available in two types: Single clam radial type for controlling flow of aggregate when charging truck mixers and counterweighted self-closing type discharge gate for fast operation in charging dump trucks.

It will pay you to check into the many other time and money-saving features these Roadbuilders' Batchers offer you. See your Johnson distributor *today*.

CJ857

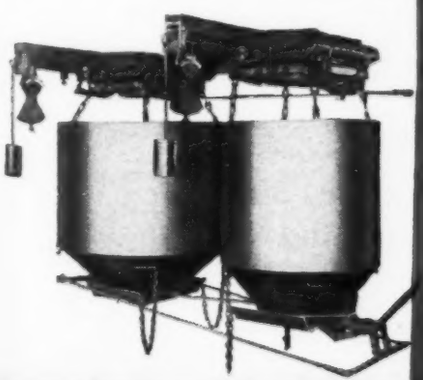
KOEHRING PRODUCT

C. S. JOHNSON

Batchers

SINGLE MATERIAL BATCHER is fast, accurate

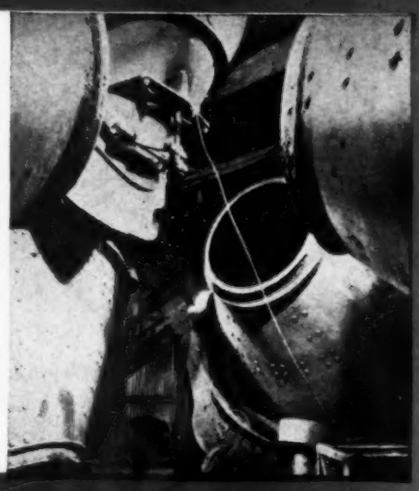
For greater speed and accuracy on your single-material bin operations, check into the Roadbuilders' Single-Material Batcher. Available in two sizes — Size 14 for half-yard mixers, and Size 34 for 34-E pavers and mixers. Completely portable. Batcher and scale are completely-assembled unit, provide simplest, trouble-free type scale . . . no scale expert needed for erection, no adjustments after erection. Heavy gauge steel plate hopper, cone bottom for fast discharge. Gang operation (shown below) batches two materials practically as fast as one.



COMPANY
Koehring Subsidiary
CHAMPAIGN • ILLINOIS

20,000 yards in one 24-hour period

Eight 4-yard Koehring Concentric Zone mixers in the Johnson Central Mix Plant at Grand Coulee poured a record 20,000 cubic yards of concrete in one 24-hour nonstop period, after pouring 5,000,000 cubic yards prior to the record run. From midnight to midnight, these mixers never stopped once.



KOEHRING COMPANY MILWAUKEE 10, WISCONSIN

Every batch a perfect mix

Improved mixing action of the revolving drum of the Kwik-Mix 16-S Dandie mixes every batch of concrete for perfect texture. You get better concrete because every particle of the aggregate is completely cement-coated. Same thorough mix in all Kwik-Mix Dandie mixers including 3½-S, 6-S, and 11-S sizes.

KWIK-MIX COMPANY PORT WASHINGTON, WISCONSIN
KOEHRING SUBSIDIARY

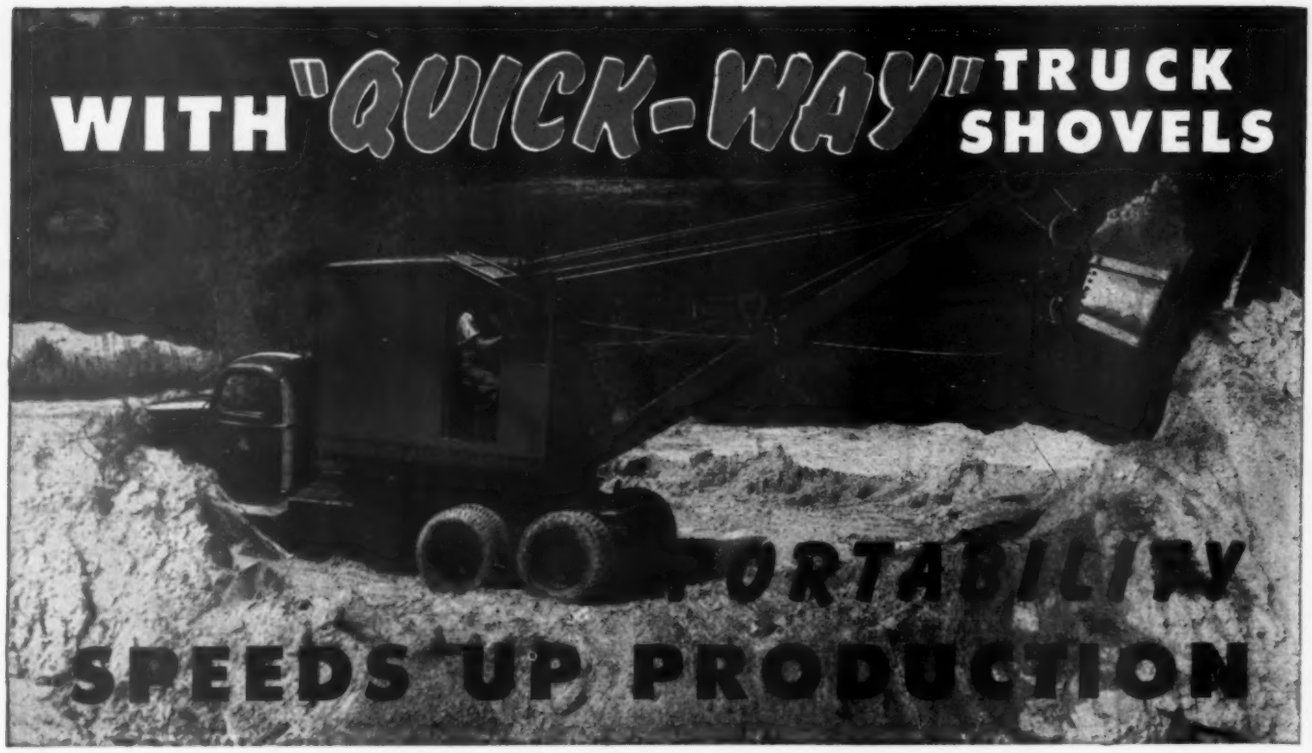
Sidesteps side obstructions

Boom of the Parsons 221 Trenchliner* quickly and easily rides on rollers from side to side across the full width of the Trenchliner. That's why the Parsons 221 Trenchliner can cut a trench as close as 10" from side obstructions. Trenches up to 8' depth, 16" to 36" wide.

*Reg. Trade-mark

PARSONS COMPANY NEWTON, IOWA
KOEHRING SUBSIDIARY

WITH "QUICK-WAY" TRUCK SHOVELS



"Speed on the job and to and from the jobs." That's **"QUICK-WAY"** PORTABILITY. **"QUICK-WAYS"** mount securely on standard motor trucks and travel at truck speeds, on or off the road. **"QUICK-WAY'S"** many attachments make your dollars go farther.

"QUICK-WAY" VERSATILITY—Shovel, crane, dragline, trench-hoe, scoop, clamshell, pile-driver or backfiller, all eight on one chassis.

"QUICK-WAY" CONVERTIBILITY — OPERATING SPEED — Fast hoist and swing action means more material moved per day.

"QUICK-WAY" INTERCHANGEABILITY—Many parts are interchangeable for easier maintenance

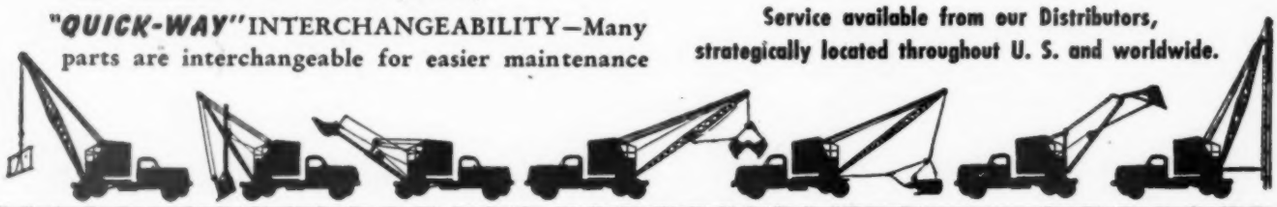
"QUICK-WAY" ECONOMY—Initial investment and maintenance costs are low, production high.

Within reach of the smallest operator as well as the largest. Regardless of what *larger* equipment you own, you need **"QUICK-WAYS"** too. There's a **"QUICK-WAY"** owner near you; ask HIM.

Model E: 4/10 cu. yd. cap. for mounting on any standard 5-ton truck.

Model J: ¼ cu. yd. cap. for mounting on any standard 1½-ton truck.

Service available from our Distributors, strategically located throughout U. S. and worldwide.



For speed, portability, economy of operation, and adaptability to a wider range of jobs, nothing of comparable size equals a "Quick-Way" Truck Shovel.

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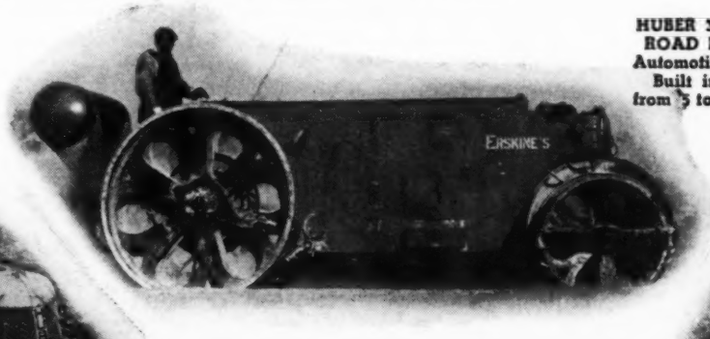
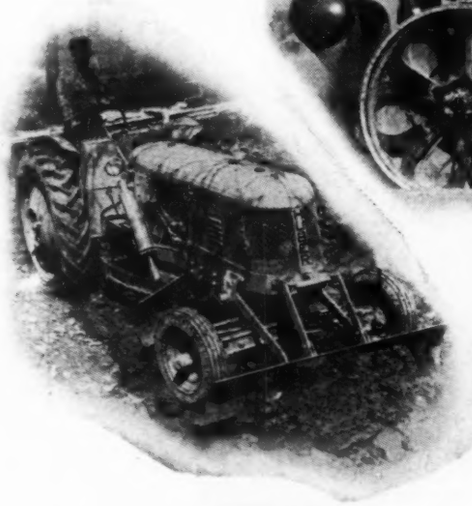
There is no secret behind the low cost operation, dependable performance and long life service of Huber Road Machinery. The answer is – IT IS BUILT FOR THE JOB. The only reason Huber Road Rollers, Tandem Rollers and the Huber Maintainer "performs miracles" on any road construction or maintenance job is because they embody every vital feature that years of experience and "know how" have prescribed as sound. Thus – speed – maneuverability – sturdy construction – simplified controls – fast, smooth operation – accessibility – and many other desirable features are an integral part of every Huber. Consider these things most seriously the next time you buy road machinery. In the meantime, visit your Huber Distributor. He is a good man to know.



HUBER 3-WHEEL ROAD ROLLER
Automotive Type
Built in sizes from 5 to 12 tons.



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readily converted into a bulldozer, lift-loader, patch roller, snowplow or rotary broom
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NEW Styling

Here are wide, massive trucks representing DESIGN with a PURPOSE . . . trucks combining appearance with comfort, safety, performance, economy, and ease of handling.

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Less turning space needed . . . right or left. Better weight distribution

Remarkable new ease of handling and driving is yours in these new *"Job-Rated"* trucks. You can turn them in much smaller circles. You can park, back into alleys or up to loading platforms with much greater ease. You get all this with a new type of steering, in combination with shorter wheelbases that accommodate full-size bodies, and the roomier, longer cabs.

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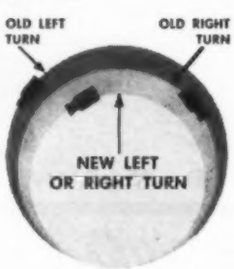

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ALL THIS... *and more...with the* NEW DODGE "J

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Note the tremendously increased *vision* of these cabs. Windshields and windows are higher and wider. New rear quarter windows add still more to vision, and to safety.

With this increased glass area throughout, you get "Pilot-House" vision . . . in *all* directions. With welded all-steel construction, they're the *safest* cabs ever built.

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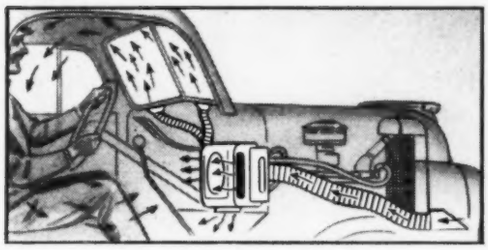

You drive in comfort whether it's 10° below or 100° above. Available is an ingenious combination of *truck* heater, defroster vents, vent windows, cowl ventilator, and a new fresh air intake from behind the front grille. It's the *finest* "All-Weather" heating and ventilating system ever installed in a truck cab.

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SEE YOUR
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FASTER WORK

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DO YOUR EXCAVATING and MATERIAL HANDLING JOBS Faster for Less

With a LIMA CRANE, SHOVEL OR DRAGLINE

Owners and operators alike are enthusiastic about the fast digging cycles, low cost of maintenance, ease of operation, and exceptional fuel and lubrication economies of LIMA shovels, cranes and draglines. Their superior performance in all classes of work is a topic of conversation with users who make it their business to know about the fine points of all makes of shovels, cranes and draglines. This comparison has resulted in a steady increase in the number of LIMAS in quarries, coal and metal mines, gravel pits, brick plants, timber and construction work of all kinds. It is convincing proof of LIMA'S superior design and performance. The little extra that you invest for the best will pay extra dividends in lower upkeep, fewer delays and greater output. Insist on the best, insist on LIMA.

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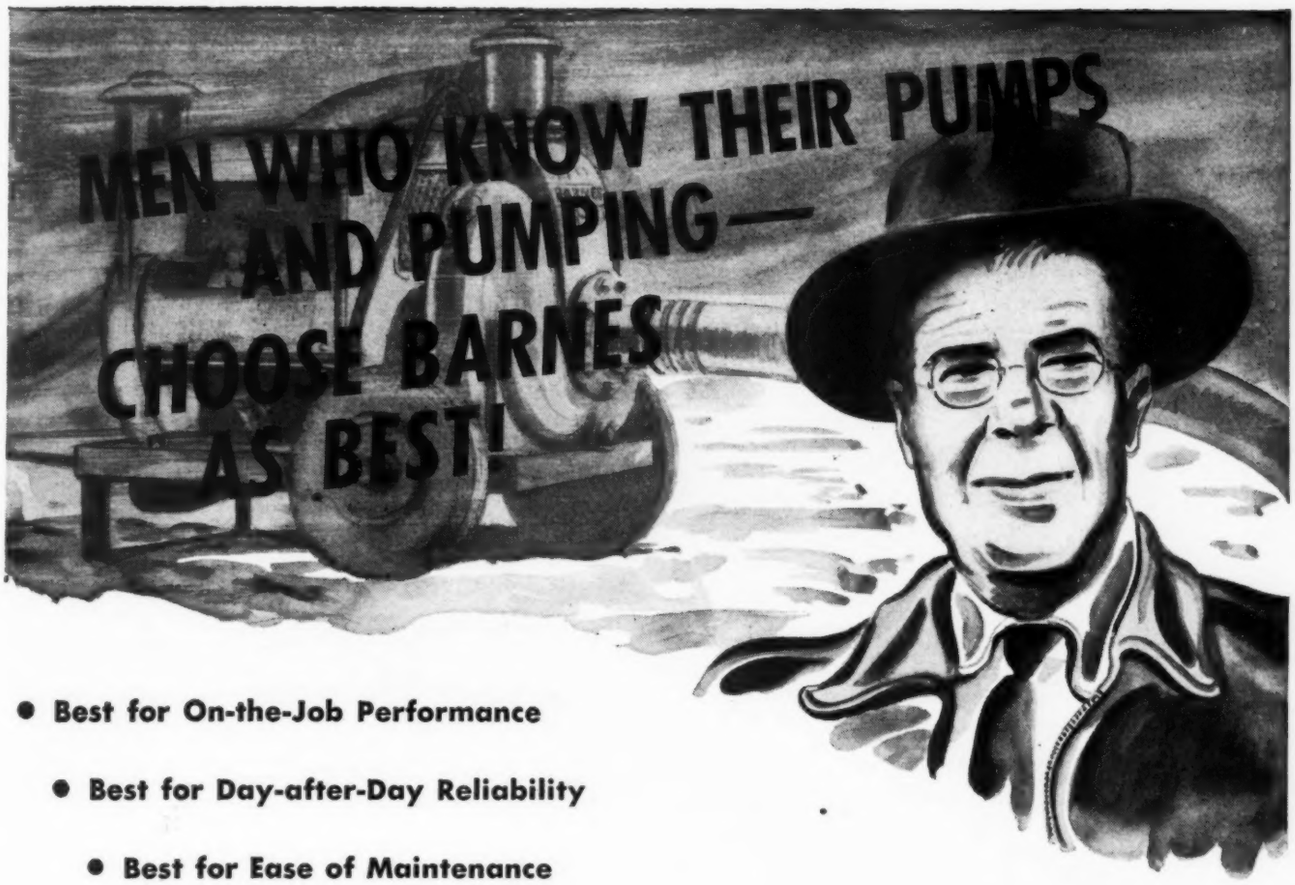

- **Best for On-the-Job Performance**
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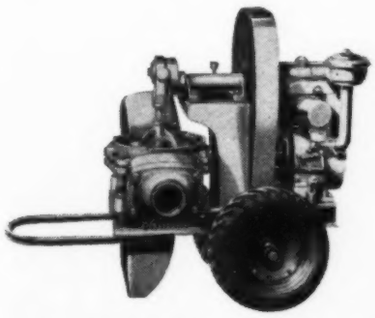
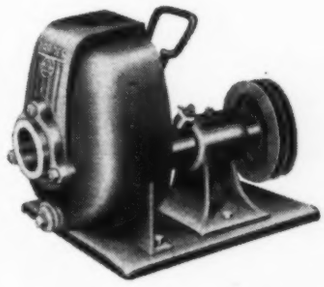


Lift-and-Force Single Diaphragm Pump
Lighter in Weight, 300 lbs. More Compact for Faster Handling. Simplified Design for Easier Servicing.



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Driven from Power Take-Offs of Tractors, Existing Gas or Diesel Engines Directly Coupled to Electric Motors.

Barnes "33,000 for 1" Automatic Centrifugal Pumps
Pumps 33,000 gallons of liquid for only 1 gallon of gas. Capacities from 3,000 to 90,000 G.P.H.

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INSURE LONGER PAVEMENT LIFE...

with Welded Wire Fabric Reinforcement

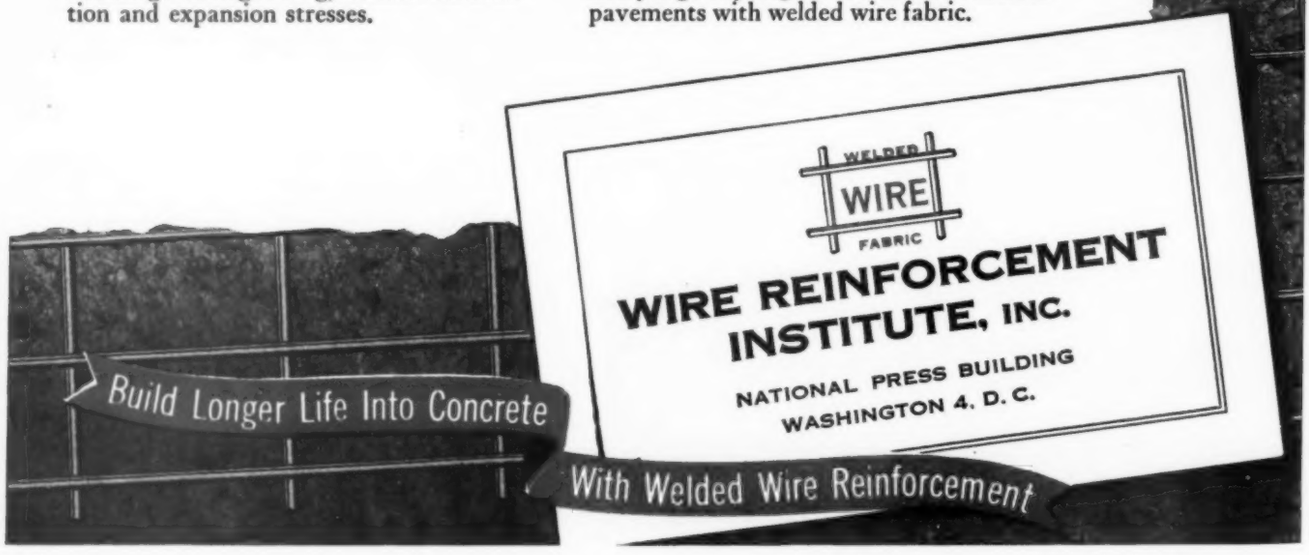
WHEN you use properly designed welded wire fabric reinforcement you build additional years of trouble-free service into concrete pavements—for the following reasons:

1. Distributed Reinforcement — Welded wire fabric distributes the strength of steel throughout the entire slab. Its many small, closely spaced reinforcement members provide the correct amount of steel exactly where it is needed. This distribution of reinforcement also prevents destructive shrinkage during curing, controls contraction and expansion stresses.

2. Positive Crack Control. Whenever cracks occur they are held to microscopic proportions by welded wire fabric reinforcement. A smooth surface is maintained by load transfer from the loaded to the unloaded side of the crack. Structural damage to the slab and undue pumping of the sub-grade are prevented.

3. Economies. Prefabricated welded wire fabric reinforcement is quickly and easily laid, at minimum labor cost. Higher allowable tensile strength in cold-drawn steel wire enables you to use less steel, less concrete. Controlled action of concrete slabs reinforced with welded wire fabric results in lower maintenance costs.

These are some of the reasons why so many highway engineers reinforce concrete pavements with welded wire fabric.



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WIRE REINFORCEMENT INSTITUTE, INC.

NATIONAL PRESS BUILDING
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Barber-Greene

New model 548-A SNOW LOADER

Clears streets fast
Saves up to 75% trucking costs...

Parallel Loading Speeds Traffic—Cuts Loading Time

The 548-A's hydraulically operated Swivel Boom Conveyor facilitates fast loading with least interference to traffic.

In the new 548-A Snow Loader, Barber-Greene offers many features of importance to those responsible for keeping busy streets clear of traffic-bogging snow. The pneumatic-tired 548-A is equipped with the B-G Swivel Discharge Conveyor that reaches over truck cabs . . . allows trucks to travel in same direction, behind or on either side of the loader . . . cuts trucking costs as much as 75% through more efficient loading. Spiral feed assures down-to-the-pavement clean-up of up to 20 cu. yds. per minute. Truck-type, four-wheel drive, and four-speed transmission. Enclosed cab is optional. Ask your B-G distributor about other advanced features.

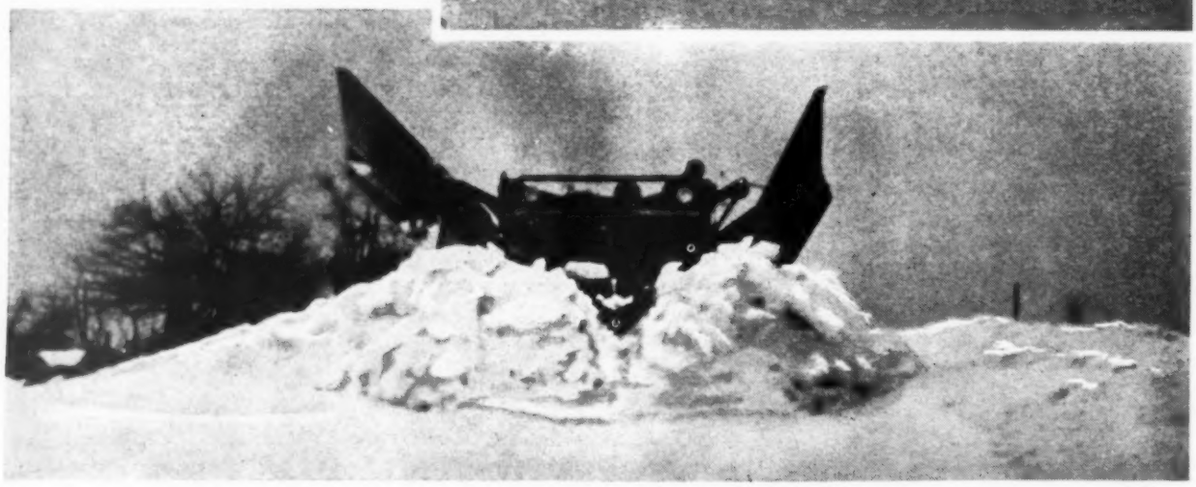
BARBER • GREENE COMPANY, AURORA, ILLINOIS

Constant flow Equipment

LOADERS | PERMANENT CONVEYORS | PORTABLE CONVEYORS | COAL MACHINES | BITUMINOUS PLANTS | FINISHERS | DITCHERS

WALTER *non-slip* TRACTION

. . . maintains full speed and pushing power on snow and ice!



IN SNOW CLEARANCE, just when you need tractive power most, conventional trucks spin away their power on slipping wheels and lose effectiveness.

Not so with Walter Snow Fighters. Operating on snow and ice brings into full operation the famous Four-Point Positive Drive to provide constantly available power and traction. Instead of wasting power on wheels of least traction, the Walter drive system concentrates the power on wheels with *most* traction at all times. This is done instantly, automatically, by three patented locking differentials.

This basic difference between Walter Snow Fighters and all other trucks is the reason why Walters wade through snow at such high speed, remove greater volume on each run, blast through deepest drifts and reduce clearance cost per mile.

Ask your WALTER distributor for full details—or write us for informative literature.

WALTER
SNOW FIGHTERS

WALTER MOTOR TRUCK CO.
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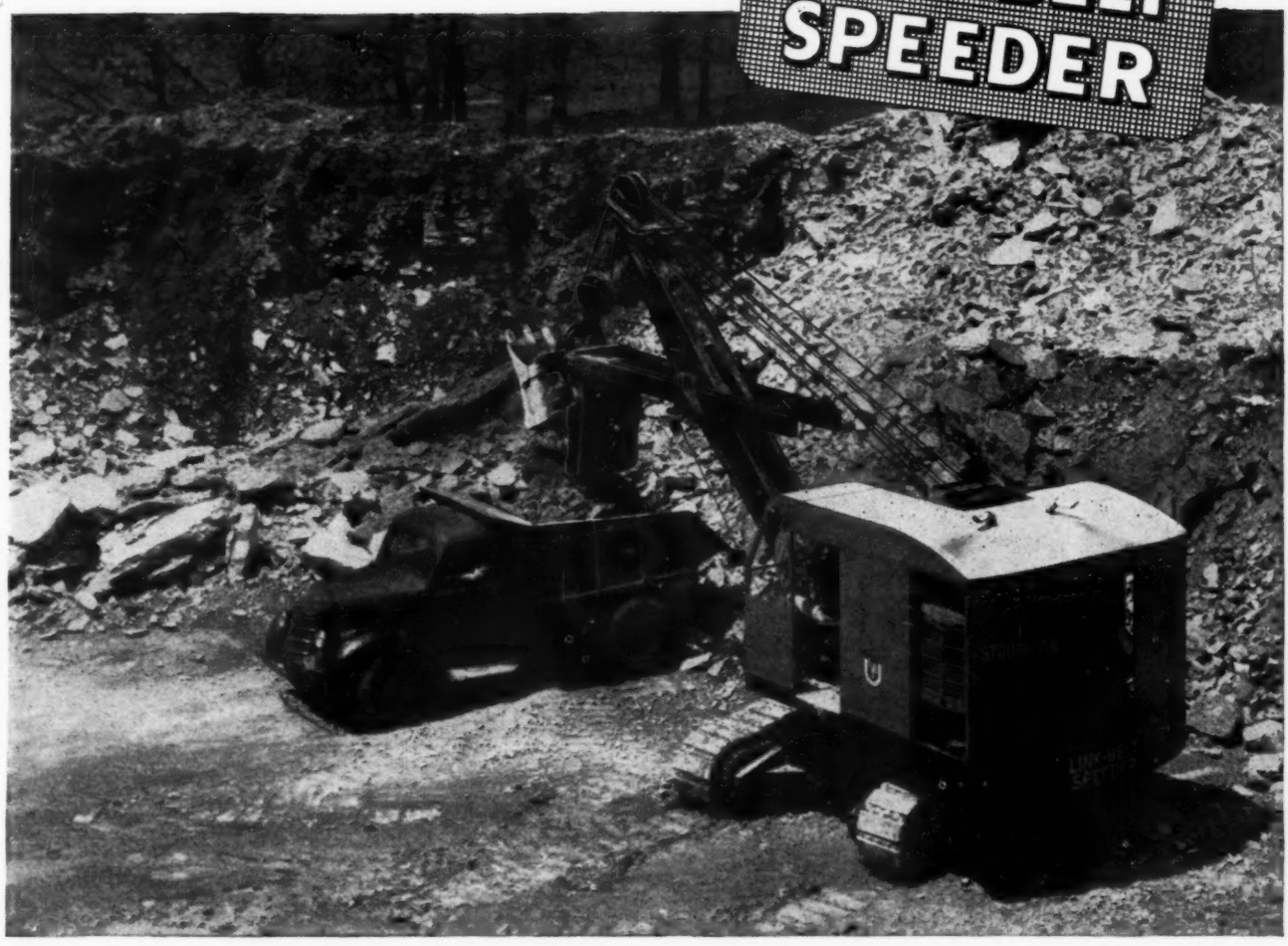
THE SERVICE BACK OF LINK-BELT SPEEDER



Keeping every Link-Belt Speeder Shovel-Crane in tip-top operating condition is one of the principal interests of Link-Belt Speeder and its nationwide distributor organization. In every principal city in United States and Canada, and in foreign lands, a stock of parts and men trained in the servicing of Link-Belt Speeder products, are in readiness to meet the needs of the user, wherever located.

Link-Belt Speeder advanced engineering, honest construction and quickly available service add up to more profitable machine hours and greater returns on your investment. Your distributor will gladly show you how the Link-Belt Speeder line of shovels, cranes and draglines ranging from 3/8 to 3 yard capacity can give you just the machine to fit your specific needs.

10,024

Every Link-Belt Speeder Shovel-Crane is quickly convertible to shovel, trench hoe, pile-driver, clamshell or dragline. You "Keep in the bidding" with your multi-purpose Link-Belt Speeder.

LINK-BELT SPEEDER

LINK-BELT SPEEDER CORPORATION, CEDAR RAPIDS, IOWA

Builders of the Most Complete Line of SHOVELS-CRANES-DRAGLINES

Cash in on The Extra Air Power of JOY COMPRESSORS and AIR TOOLS

The New Series 80 PORTABLE AIR COMPRESSOR
delivers 60 to 630 C.F.M.
"Econo-Miser" Load Control on most models

K-81 PAVING BREAKER
SILVER STREAK
CADMIUM PLATED FOR
GREATER IMPACT
FASTER DRILLING
LONGER LIFE
NO RUSTING
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JOY LIGHT WEIGHT
WAGON DRILL
GETS 50 TO 80% MORE FOOTAGE THAN SAME-SIZE HAND-HELD DRILL

Write for Bulletins giving full details

Consult a Joy Engineer

SULLIVAN DIVISION
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GENERAL OFFICES: HENRY W. OLIVER BUILDING • PITTSBURGH, PA.

Brand NEW for '48

FORD Bonus* Built TRUCKS

BUILT STRONGER TO LAST LONGER

New all through!

NEW ENGINES! Brand new Six, two new V-8's... up to 145 h.p.

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NEW FRAMES! Tougher, more rugged than ever!

NEW BIG JOBS! Biggest Ford Trucks ever... up to 21,500 lbs. G.V.W.

NEW MODELS! Five new series, more than 115 Ford models!

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Bonus* Built —THE AMAZING RESULT OF AN ENGINEERING PRINCIPLE THAT ASSURES LONGER TRUCK LIFE... and ONLY Ford Trucks Have It!

The great new Ford Trucks for '48 are revolutionary not only because they are *new all through* but because they are the amazing result of a time-proved truck engineering principle. This principle is Ford Bonus Built construction.

Bonus Built—Extra Strength! Every single one of the great new Ford Trucks for '48 is Bonus Built . . . designed and built with a margin of *extra strength* in every vital part. But that is only *part* of this vital truck building principle...

Bonus Built—Work Reserves! This *extra strength* provides WORK RESERVES that pay off for truck operators in two important, money-saving ways . . .

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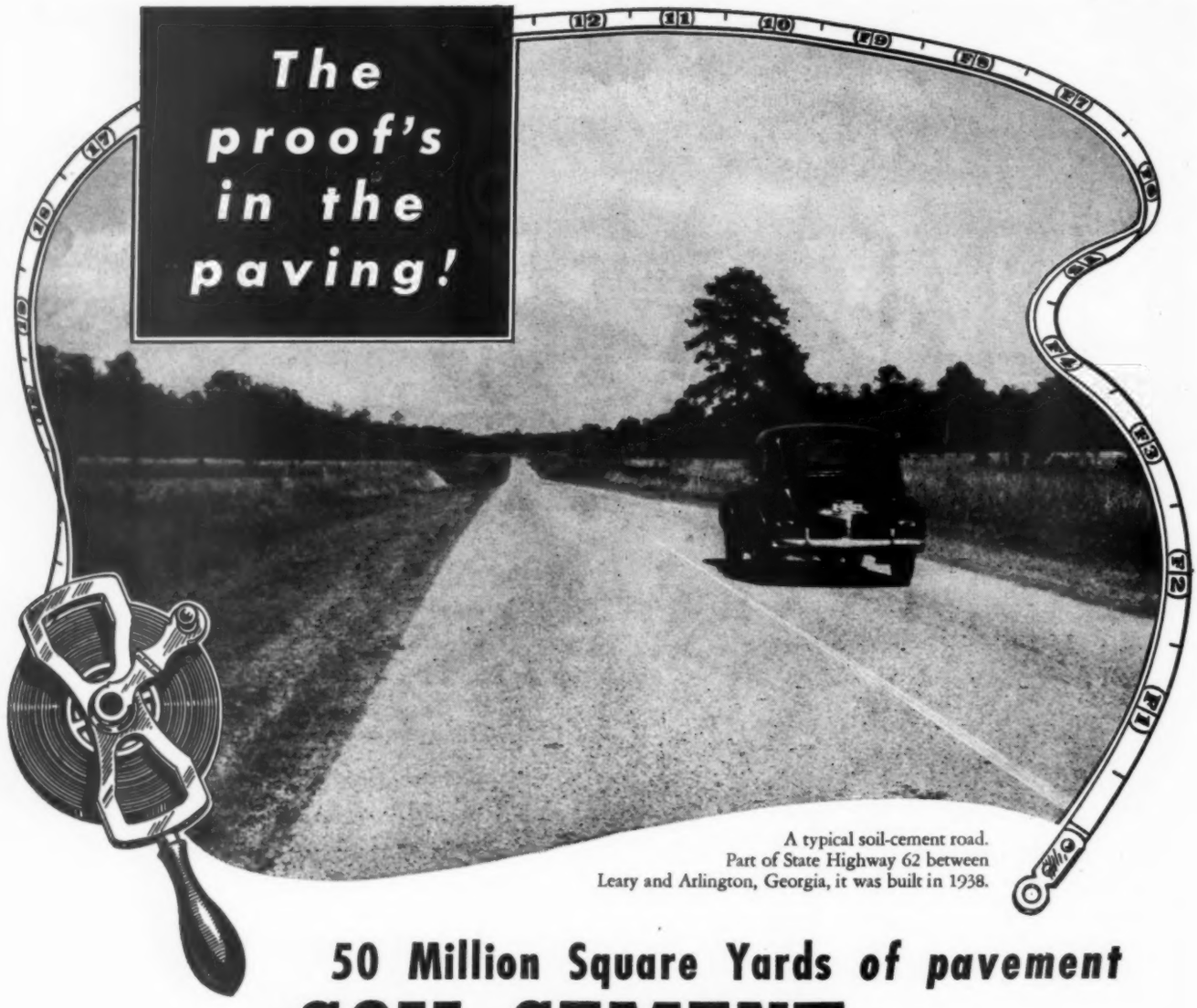
Bonus Built—Longer Life! What's more, these same WORK RESERVES allow Ford Trucks to relax on the job . . . to do their jobs easier, with less strain and less wear. Thus, Ford Bonus Built Trucks last *longer* because they are built to work *easier!*

See the great new line of Ford Bonus Built Trucks for '48 now!

***BONUS:** "Something given in addition to what is usual or strictly due."—Webster's Dictionary*

LIFE INSURANCE EXPERTS PROVE . . . FORD TRUCKS LAST UP TO 19.6% LONGER!



A typical soil-cement road.
Part of State Highway 62 between
Leary and Arlington, Georgia, it was built in 1938.

50 Million Square Yards *of pavement measure* SOIL-CEMENT *acceptance*

SINCE the first soil-cement road was built in 1935 more than 50 million square yards of local roads, streets and airport runways have been paved the low-cost soil-cement way. That's enough pavement to build a road 20 feet wide from Boston to Los Angeles, and then up to Seattle!

Today both the American Association of State Highway Officials and the American Society for Testing Materials have adopted standards for soil-cement testing procedures and state highway departments are equipped for soil-cement testing.

Paving costs the soil-cement way are low, too, because about 90 per cent of the required material is native soil already on the site. To get more miles of durable, all-weather, light-traffic pavement from your construction funds, use soil-cement.

Write for further free information on soil-cement paving. Distributed only in the United States and Canada.

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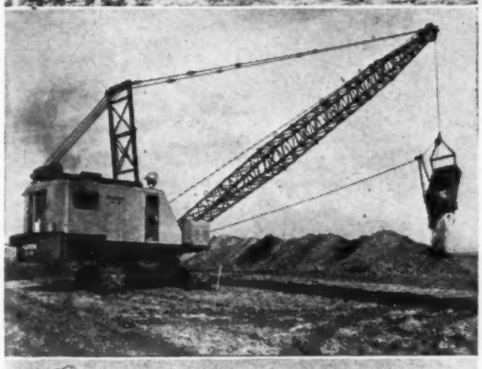
DEPT. 2-28, 33 W. GRAND AVENUE, CHICAGO 10, ILLINOIS

A national organization to improve and extend the uses of portland cement and concrete . . . through scientific research and engineering field work.



Save with MARIONS

There is a MARION to save you Time and Money on every job

Modern features of design, plus sound engineering throughout, have made MARION shovels and draglines top performers in the handling of materials on construction projects of all kinds. They have the speed, power and the stamina to STAY ON THE JOB without let-up . . . and to handle capacity yardage in record time. They are real money makers for every owner.

THE MARION LINE

GASOLINE • • • DIESELS • • • ELECTRIC

Model	*Capacity*	*Model*	*Capacity*
33-M . . .	¾ cu. yds.	151-M	6 cu. yds.
362	1½ cu. yds.	*7200 Walker . .	5-7 cu. yds.
93-M . . .	2½ cu. yds.	*7400 Walker	8-12 cu. yds.
111-M .	3½-4 cu. yds.	*7800 Walker	15-30 cu. yds.
492	3 cu. yds.	*Size of dragline bucket	
4161	5 cu. yds.	depends on length of boom.	

What is your material handling problem?

from ¾ cu. yd. POWER SHOVEL COMPANY MARION OHIO SINCE 1884 to 40 cu. yds.

MARION

POWER SHOVEL COMPANY

MARION, OHIO, U. S. A.

Offices and Warehouses in all Principal Cities

TONCAN IRON

TONCAN* Iron Corrugated Metal Pipe Lasts Longer... Saves Money!

Here's why:

1. **RESISTS RUST AND CORROSION**—because Toncan is an *ALLOY IRON,* containing *twice* the copper found in copper-bearing steels and irons *PLUS* molybdenum.
2. **STRONG AND FLEXIBLE**—can carry heavy loads—is unaffected by vibration, impact, severe weather changes, earth settlement, etc.—prevents cracking and crumbling.
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GOODYEAR

ROADS AND STREETS

FEBRUARY, 1948 • VOL. 91 • No. 2

Expanding Mitchell Field

- **Medley of equipment helped speed expansion project at Milwaukee airport**
- **Strengthening 1100-ft. ditch enclosure with sectional plate arches a feature of job**
- **Long hauls a problem in grading and base construction**
- **Design and construction details of this $3,250,000 project, first phase in 5-year ultimate plan**

By *Harold M. Maxwell*
Field Editor, Roads and Streets

KNOWN as Milwaukee City Airport when first built in 1927, the field now called General Mitchell Field was enlarged before the war to include four 100-ft. wide bituminous concrete runways. An expansion program was started in 1945 when Horner and Shiffrin, St. Louis consulting engineers, recommended expansion of Milwaukee's various small and large airports.

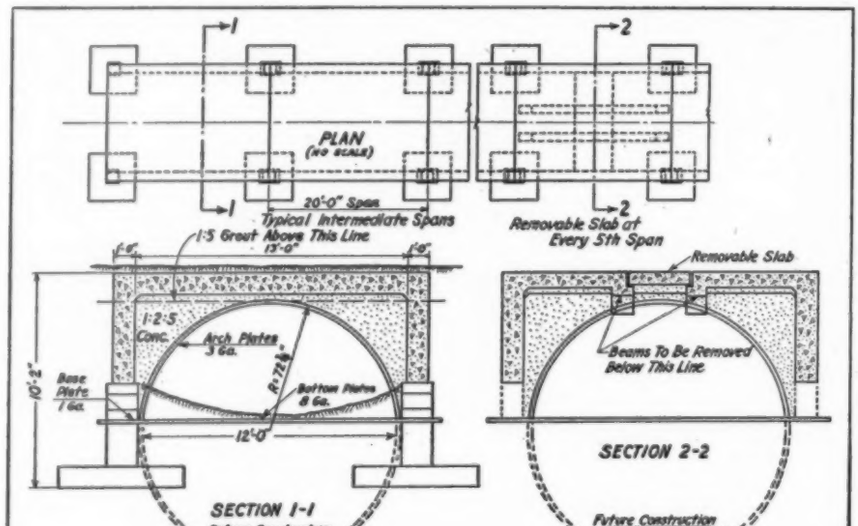
Mitchell Field, being the city's chief airport, serves metropolitan Milwaukee as a terminal and operating base for airplanes, private fliers, local aviation organizations, Army reserves, and a National Guard aviation unit.

The ultimate field will have 3 sets of dual runways. Final completion of the $10,500,000 projected program for this field is expected in 1960. Financed by regular county tax funds and a bond issue, the first phase is estimated to cost about 3¼ million for development. Federal funds in the amount of $110,000 have been tentatively allocated for future use, and it is anticipated that additional allocations will be tendered from time to time. When CAA funds are made use of, the Milwaukee County Board of Supervisors will be the sponsoring agency.

The first-phase construction includes grading, drainage, paving, seeding and sodding—mostly in connection with a 200-ft. wide concrete north-south runway, built first be-

★This unusual track-side pit speeded unloading and delivery of bulk cement. Two trucks could swing in and load at one time. Notice hinged cover on left truck

★ How metal arch sections were placed under roof of drain tunnel, as part of strengthening procedure. Concrete was shoveled by hand to fill space over arch



★ Details for 1109-ft. tunnel lining. Armco steel plates and concrete filler were added to form a sturdy arched section

cause of its 6729-ft. length.

Aircraft will continue to use the old bituminous and concrete runways day or night, but the new runway is for daylight hours only. A high intensity lighting system and CAA instrument landing system installation are expected to get under way this spring.

Clearing for Action

As shown on the plan sketch, the improvements involve removal of considerable areas of existing pavement. Removal of the 13,550 sq. yd. of old concrete was postponed as long as possible. Several streets passing through the new airport site proved to be excellent ready-made haulroads—sorely needed on this long-haul job. Pavement was easily broken with a 3,200-lb. breaking ball, dropped 8 ft. A 2½-yd. Northwest shovel loaded broken slabs into trucks and Euclids for disposal in deep fill beyond pavement area.

Ten portable "T" type hangars and an old NYA shop were moved into a 600 x 1200-ft. corner area, set aside as a sort of private flyers' colony. The taxiways and roads in this area were given an 8" compacted granular base course and a 3" compacted wearing course in anticipation of eventual black-topping.

Drainage Tunnel Lining

An outstanding feature of this project is the strengthening and lining of 1109 ft. of existing covered ditch. All underdrains and storm sewers flow into this "underground river," thus draining the entire saucer-shaped airport. Relocating this structure, which passes under both old and new runway pavement, would be a difficult task. So the engineers decided not to relocate the enclosure but to use it as a channel for removing all drainage water from the airport.

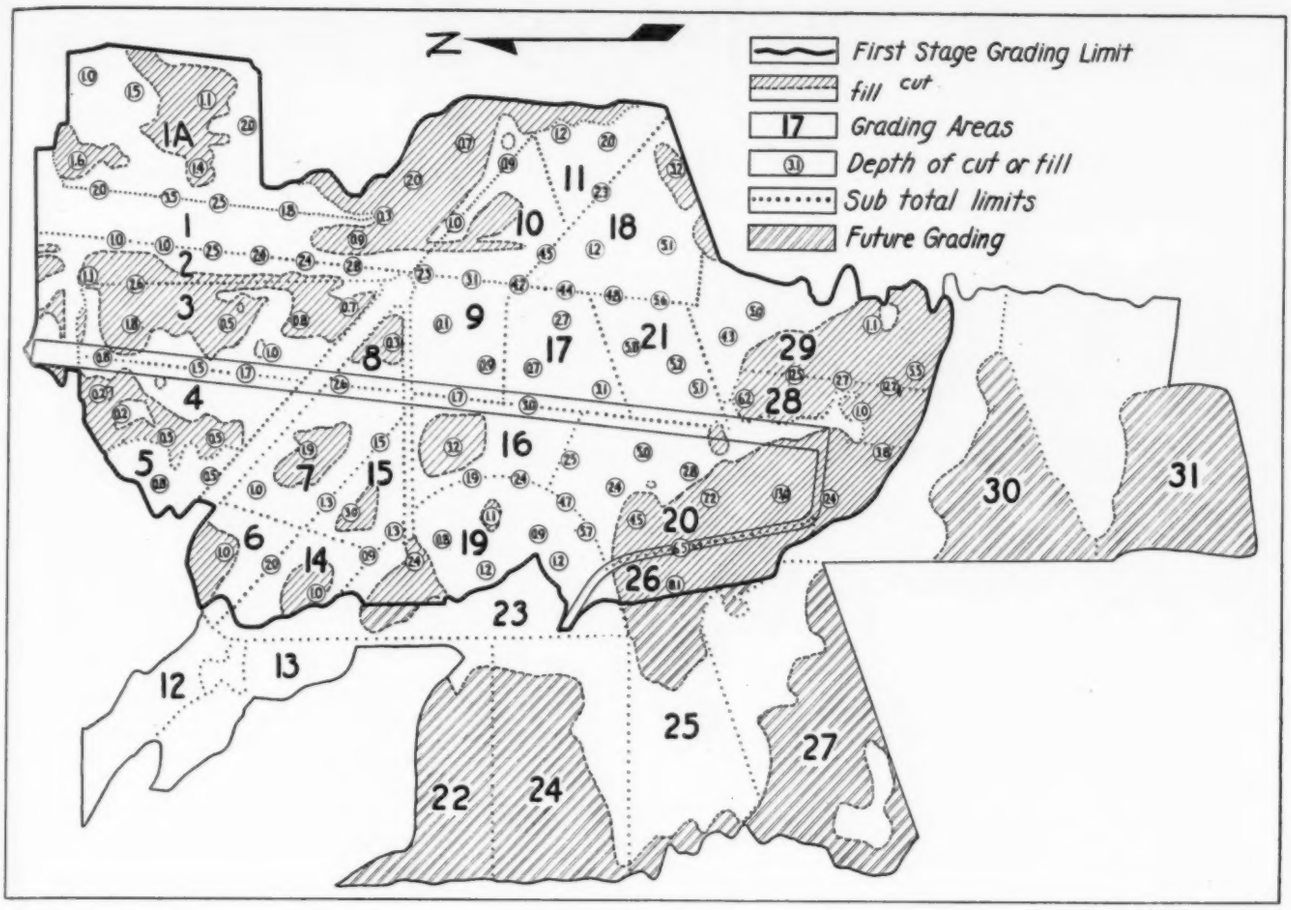
Built in 1936 of reinforced concrete, the enclosure consisted of a 12-in. concrete roof with 12-ft. clear span supported on 12-in. concrete walls, 5' 3" high. The walls acted as continous beams supported every 20 ft. by piers and spread footings. Portable roof slabs were provided every fifth span for access. This structure, designed for a 50,000-lb. plane load, has proved very satisfactory, but required strengthening to carry the new 150,000-lb. design load. Armco steel arches having a 72¾-in. radius were inserted under the old roof and grout-filled. The plates were No. 3 gage

Estimated Grading Quantities

(See Grading Map)

Area	Total Fill from X-Section	Total Cut from X-Section	Under Cut Rwys. & Txy.	Amt. Additional Fill Req. Cu. Yd.	Amt. Excess Cut Available Cu. Yd.
1A	78,668	57,728	20,940	.....	.....
1	88,007	5,625	39,855	42,527	.....
2	55,680	5,897	32,004	17,779	.....
*3	21,678	36,302	19,215	.....	33,839
4	20,525	3,785	18,063	.....	1,323
5	8,204	.....	5,649	2,555	.....
6	20,918	3,274	16,155	1,489	.....
7	17,650	6,324	18,840	.....	7,514
8	8,237	1,709	4,800	1,728	.....
9	62,764	.....	34,260	28,504	.....
10	61,056	3,088	44,640	13,328	.....
11	28,525	55	22,989	5,481	.....
14	22,201	3,569	15,381	3,251	.....
15	16,284	1,052	14,574	658	.....
16	52,453	11,988	24,441	16,024	.....
17	126,492	.....	30,468	96,024	.....
18	168,846	4,200	55,764	108,882	.....
19	103,073	2,059	90,163	10,851	.....
20	153,193	355,625	73,782	.....	276,214
21	181,829	.....	33,330	148,499	.....
26	.....	102,727	15,393	.....	118,120
28	.....	100,001	6,995	.....	106,996
29	117,690	163,059	47,759	.....	93,128

*In area No. 3 there is 20,242 cu. yd. available for first stage grading, the remaining 13,597 cu. yd. becoming available when the Eastern N-S Taxiway is removed.



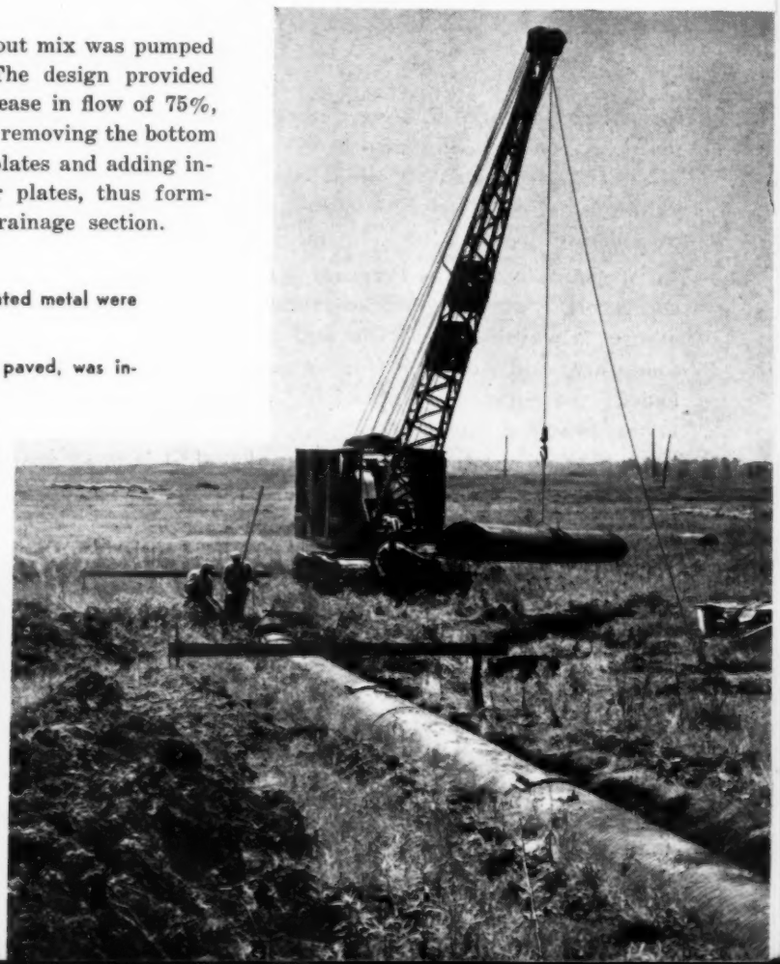
★ Grading map of field. Heavy solid lines mark first-stage grading area, covered in the current project. Cross-hatching shows cut areas. Dotted lines indicate the various cut-fill areas, which are numbered in reference to grading table showing quantities of cut, fill, undercut, and amount of excess cut or fill. Circled figures show depth of fill or cut

(about ¼ in.) steel. Arches rested on No. 1 gage (9/32 in.) base plates, tied together by No. 8 gage (11/64 in.) bottom tension plates. The area between the arch liner plates and the walls and roof of the existing tunnel were filled with 1:2:5 concrete mix up almost to the crest of the arch.

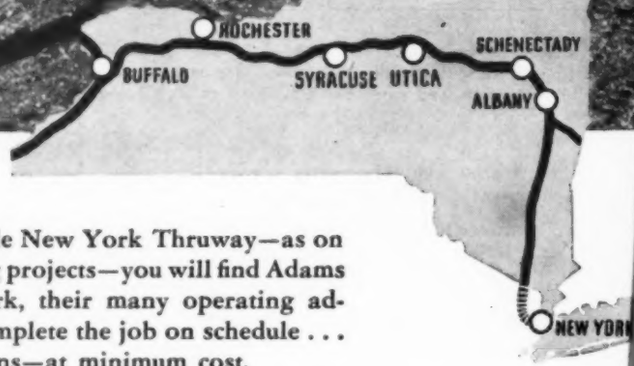
A 1:5 cement grout mix was pumped into all voids. The design provided for a future increase in flow of 75%, made possible by removing the bottom plates and base plates and adding inverted arch liner plates, thus forming a circular drainage section.

★ How the larger pipe arch sections were handled. Arches of corrugated metal were used for storm drains, going to heavier gage under pavements

★ Perforated corrugated metal pipe, bituminous coated and invert paved, was installed along either edge of runways and taxiways



Adams advantages at work on great New York Thruway—



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Storm and Subdrains

The major portion of the drainage piping was installed before final construction was started. Corrugated iron pipe was used throughout. Storm drains varied from 15 to 43-in. extra heavy gage. Eight-inch and 12 in. perforated corrugated pipe underdrains parallel each edge of runways and taxiways. They are backfilled with gravel and equipped with inspection risers consisting of concrete-encased vertical corrugated pipe. All drains empty into the arched tunnel, and all drainage pipes, even the perforated underdrains, are bituminous coated with paved inverts.

All arch pipe was rail shipped. The heavy 20-ft. pipe sections, weighing as much as a ton, were unloaded by cable sling and crane. The big units were stockpiled at the siding. Trenches for storm drains were excavated by dragline, and backfill compacted by hand-tamping followed by tractors. A Cleveland 95 trenching machine excavated for the underdrains. Gravel backfill for drain trenches and for the base course was spread and compacted practically in one operation. Ready-mixed concrete was used in catchbasins and inspection holes.

The major drainage quantities and unit prices are shown in the following table:

Description	Quantity	Unit	Unit Price Installed
*Underdrains			
8 in. pipe....	19,500	L.F.	1.67
12 in. pipe....	1,780	L.F.	2.35
**Storm Sewer Pipe			
15 in. 16 gal...	520	L.F.	3.80
29 in. x 18 in. 14 ga.	2,255	L.F.	6.75
36 in. x 22 in. 12 ga.	400	L.F.	9.66
36 in. x 22 in. 14 ga.	1,370	L.F.	7.60
43 in. x 27 in. 10 ga.	200	L.F.	14.00
43 in. x 27 in. 12 ga.	520	L.F.	10.50

Footnotes to foregoing table:

*Perforated, corrugated metal pipe with bituminous coating and paved invert. Excludes inspection holes and granular backfilling.

**Perforated, corrugated metal pipe with bituminous coating and paved invert. Includes excavation and backfill.

Encased Cable Ducts

Fiber ducts required where cables cross under runway were given 3 in. minimum concrete cover and laid with minimum slope of 3 in. in 100 ft. All ducts extend to a point 3 ft. outside the underdrain backfill.

After grading was completed a 4x 4x15-in. precast marker was set at each end of each duct, to indicate its location and the size and number of conduits.

Duct quantities are shown in the following table:

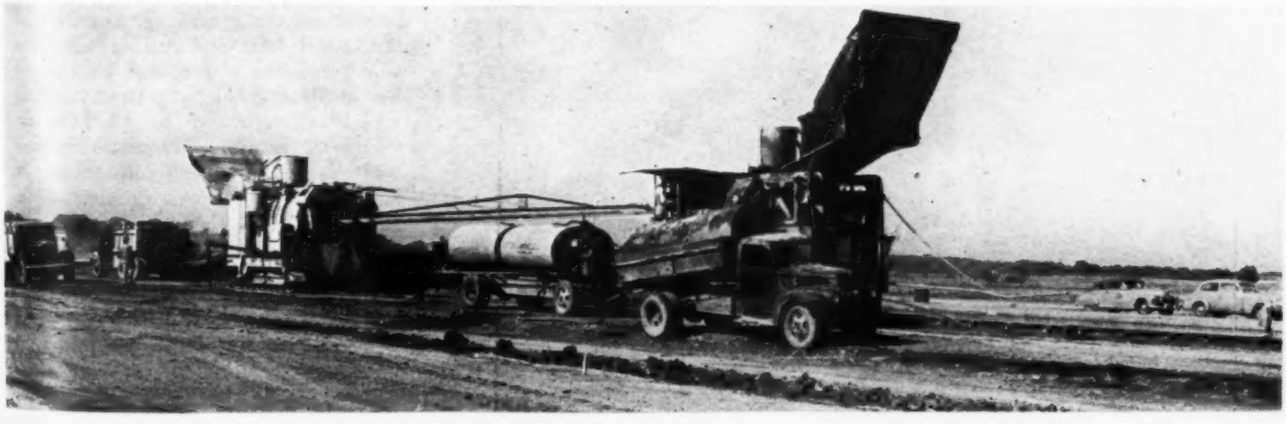
Description	Quantity	Unit	Unit Price
4-in. single duct..	2,135	L.F.	1.25
4-in. 2 duct banks	655	L.F.	2.00
3-in. 3 duct banks	4,012	L.F.	2.25

Rough Grading Delayed

Long hauls, wet weather, and prevalence of clay material complicated the 1,431,400 cu. yd. grading job. But the presence of three existing streets as made-to-order concrete haul roads, and the efficient use of modern grading equipment available helped offset the difficulties. The contractor was aided by a grading map that was exceptionally well detailed—see accompanying simplified reproduction and explanatory caption.

Soil involved was mostly PRA

★ Another equipment combine—one of the big new Allis-Chalmers HD19 tractors giving a Gar Wood scraper a work-out

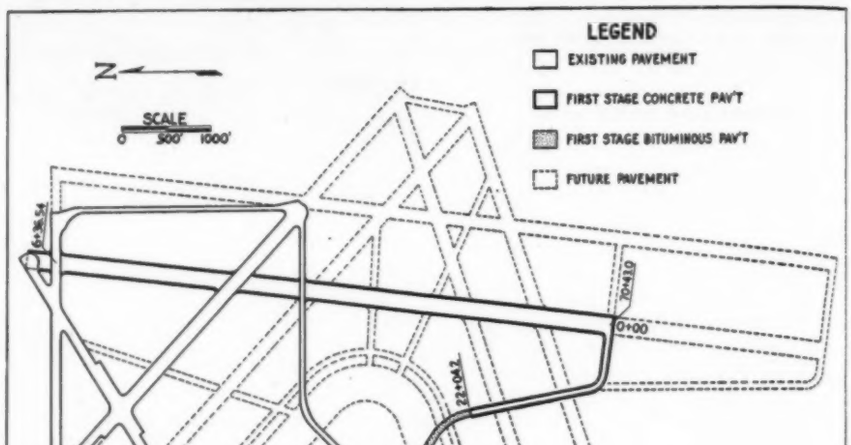


★ Two 34-E dual pavers and subgrade sprinkling took lots of water. Contractor's answer was a 2,200-gal. trailer tank

class A-6, a plastic clay loam, with some A-4 soil, a silty loam. These soils are impermeable and stable when dry and undisturbed, but plastic and absorbent if disturbed. A granular base was deemed essential.

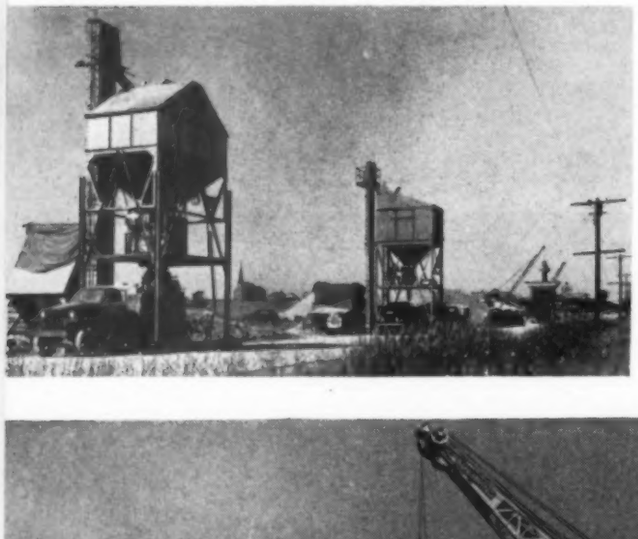
Although the grading contractor was ready to start May 1, unusually heavy continuous spring rains and swampy, mucky soil conditions delayed start of grading operations until mid-June. Long hauls were the rule, some hauls being 1½ to 2 miles. One-third of the earth was hauled more than ½ mile. For short hauls 30 and 15-yd. scrapers pulled by Caterpillar D8 and Allis-Chalmers HD14 tractors were used. A varied fleet consisting of 15-yd. Tournapulls, an 18-yd. Heiliner, a shovel-loaded, 18-yd. Heil Dirtmover and Euclids solved the long haul problem. After the rains, grading progressed at 25,000 cu. yd. per day. From July to October there was very little rain. Dust on the haul roads was controlled by constant use of 2000-gal. 6 x 6 water trucks.

The major area of the grading was fill, most of the cut being in the southwest area. About 150,000 cu. yd. of peat, some of it 15 ft. deep, was removed and replaced by good clay. Peat was wasted in the southeast corner.



★ General Mitchell Field—Past, present, and future. Light solid lines: existing pavement. Heavy solid lines: 1st stage concrete. Shaded area: 1st stage bituminous pavement

Sheepsfoot rollers followed by a wobble wheel roller compacted the subgrade in 8-in. lifts to 95% mod. Proctor density. Very little water was required for compacting the lower lifts. Also, little shaping and blading were necessary. Topsoil in both cut and fill areas was cut 3 in. deep and stockpiled. The bulk of the grading was completed by November 1.



★ Trucks take on stone (in foreground), sand, then cement, and are on their way without turning or shuttling out of line. Two trucks take two stone sizes simultaneously. Note use of concrete street as haul road; also use of tarps over cement receiving hoppers

Granular Base Course

The impervious clay subgrade made a granular base course essential. About 184,000 sq. yd. of 12-in. 95% compacted granular backfill was required to serve as a base under the runway and taxiway. This includes an additional 3-ft. width on each edge needed to cover underdrains.

Base laying was started July 6. Commercial pit-run gravel which met specification requirements was hauled 4½ miles. Gravel was loaded in 6-yd. dump trucks by three Unit ½-yd. shovels and loads spotted in longitudinal rows at a predetermined spacing to give the 6-in. lift desired. A No. 12 Caterpillar motor patrol grader performed the spreading. Starting at the center lane and ending with the side lanes, the gravel was compacted by a Bros pneumatic-tired wobble wheel roller, drawn by an International D9 tractor. Compaction water was hauled in 2,000-gal. tanks on Studebaker 6x6 trucks. Compaction to 95% density was easily obtained.

TABLE OF ADDITIONAL QUANTITIES AND UNIT COST

Description	Quantity	Unit	Unit Cost
Pavement removal	13,550	S.Y.	$ 0.50
Tunnel lining	1,109	L.F.	111.00
Grading	1,357,000	C.Y.	0.38
12-in. granular base course	184,900	S.Y.	0.70
12-in. concrete pavement	170,855	S.Y.	3.54

Concrete Paving

The top surface of the base was given its final finish with a standard subgrader and a Wehr 5-ton subgrade roller which ran just ahead of the paver. This subgrader, which the contractor moved from California, is said to be the first of its type to be used east of the Mississippi. This machine, which is set to grade and towed by a tractor, has a conveyor belt which discards the dirt on the outer side of forms.

The first-stage construction plans call for 6729 x 200' by 12" runway and a 75-ft. taxiway. Using air-entrained concrete, the runway consists of eight 25-ft. wide sections, each with longitudinal dummy groove joint on its center line. Only the two outside lanes have transverse dowels under the dummy joint. Transverse dummy joints occur every 20 ft. and doweled transverse expansion joints occur approximately every 500 ft. The taxiway is of similar design.

Eight 10-yd. semi's hauled the sand 18 miles from a commercial pit and commercial quarry stone was hauled 7 miles by twelve 6-yd. dump trucks.

The contractor's method of unloading bulk cement at a rail siding 2½ miles from the job was of special interest. The accompanying pictures show how two trucks could be loaded simultaneously from two railroad cars. The trucks were driven down the ramp and each stopped under a discharge chute. A 13½' x 9" dia. under-track screw conveyor powered by two gasoline engines (1 Waukesha and 1 Hercules) transferred cement. Compressed air was supplied by a 60 cu. ft. Le Roi compressor. A 10-ft. vertical cut adjacent to the tracks was required to permit the cement to be discharged from bottom of car hopper to truck. The bank material was so hard that scarifying was needed before the bulldozer could cut it down. A wood cribbing backfilled with cinders prevented movement of the railroad subgrade.

Prior to paving operations, 6,000 cu. yd. of sand and 10,000 cu. yd. of stone were stockpiled. A Koehring 1½-yd. crane handled stone into two bins, and a 1-yd. Koehring crane moved sand into a third bin. Bins were 55-ton capacity. Exterior wood baffles on the bins provided protection from spilled material. One Heltzel and one Butler 300-bbl. bin were provided for cement. The arrangement of all five bins on the concrete "haul-road street" enabled trucks to stay in line. The photograph shows how five trucks could load simultaneously.

Concrete was hauled with 15 two-batch trucks equipped with cement boxes. Being unable to obtain 12-in. steel forms readily, the contractor used 8-in. forms set on 4 x 8's. A D4 International tractor crane proved efficient in loosening, handling, loading, and unloading 350-lb. form sections.

The 170,855 sq. yd. of paving was placed with two 34E Koehring dual-drum pavers placed boom to boom outside of forms. Dual (6 x 6) 2000-gal. trucks hauled mix water to a 2200-gal. trailing water tank, pulled by one of the pavers. Equipment following the pavers included a Blaw-Knox spreader, Jaeger finishing machine, Flexplane and a Koehring longitudinal float finisher. Truseal formula 33 (wax base), a curing compound, was used to cure the pavement. A contractor-built air compressor unit sprayed compound.

Paving began July 30 and was completed October 8. During the 45 9-hr. paving days the maximum daily run was 1,367 batches which yielded 5,678 sq. yd. or 1,890 cu. yd. Average daily run was 1,264 cu. yd. or 3792 sq. yd.

During paving operations at the north end of the runway at least two runways had to be available for landing aircraft. Unfortunately, the batch trucks crossed one end of a live runway. The contractor solved the problem by buying a radio. When clearance was needed, the operational tower radioed flagmen who flagged down the batch trucks—simple but effective.

Equipment Used at Mitchell Field

Concrete Paving

Cement Unloading Site

2—13'6"x9" dia. under track screw conveyors. Powered by 2 gas. engines (1—Waukesha, 1—Hercules).
1—Gar Wood winch powered by Le Roi motor.
1—60 c.f. Le Roi air compressor.

Batching Plant

3—55-ton Model V Butler material bins.
1—Heltzel 300 bbl. cement bin.
1—Butler 300 bbl. cement bin.
1—Koehring 605 1½-yd. crane w/Koehler light plant.
1—Koehring 301 1½-yd. crane.
1—40 Caterpillar tractor and bulldozer.
1—Wilson 200 amp. electric welder.
1—2" Jaeger 15M centrifugal pump.
1—1½" Jaeger 10M centrifugal pump.
1—60' Le Roi air compressor.
1—1937 Chev. truck with Alemite lubrication unit.
1—1942 Chev. winch truck.
1—Lawson AC light plant.
1—Fuel truck—1,500-gal. cap.

Fine Grade

1—Standard subgrader.
1—Caterpillar D-8 tractor bulldozer.
1—Wehr 5-ton subgrade roller.
1—D-4 International tractor crane.
1—1947 Ford, 2-ton truck for hauling forms and supplies.
4,200—Heltzel 8x8"¼" steel forms with 4-in. wood extension.

Paving

2—34E-2A Koehring dual drum pavers.
1—Blaw-Knox 25' spreader.
1—Jaeger Type "H" 25' finishing machine.
1—25' Flexplane.
1—Koehring 25' longitudinal float.
4—25' finishing bridges.
2—Kohler 1,500-watt, 110-v. portable light plants.
1—2,200-gal. trailing water tank.
1—Gilbrac air compressor for applying curing compound.

Hauling Equipment

Cement Haul

4—Studebaker 6x6 trucks hauling 60 bbl. cement each.

Material Haul

Sand—8-10 c.y. semi-trailer trucks.
S one—12-6 c.y. dump trucks.

Batch Haul

5—2-batch Mack trucks.
10—2-batch Studebaker 6x6 trucks.

Water Haul

2—2,000-gal. Studebaker tank trucks w/spray bar and pump.
1—1,000-gal. Ford tank truck.

Miscellaneous

2—Pickups.

Granular Base and Traffic Bound Haul

45—ave. 6 c.y. dump trucks.

Grading Equipment

1—2½ c.y. Northwest shovel and dragline.
1—1 c.y. Koehring 301 dragline.
6—15 c.y. Le Tourneau Tournapulls.
1—18 c.y. Heiliner.
3—30 c.y. scrapers with Caterpillar D-8 tractors.
6—15 c.y. scrapers with Caterpillar D-8 tractors.
1—15 c.y. scrapers with AC HD-14 tractor.
1—18 c.y. Heil dirt mover.
5—18 c.y. Euclid wagons.
3—D-8 Caterpillar push "cats."
1—D-7 Caterpillar bulldozer.
2—D-8 Caterpillar bulldozer.
3—Caterpillar 12 motor patrols.
1—Case industrial tractor.
4—Sheepsfoot rollers.
6—Portable light plants.
1—2,000-gal. water truck.
1—Winch truck.
3—Pickups.
1—Grease truck.
1—Fuel truck.

Granular Base Equipment

1—Caterpillar 12 motor patrol.
1—ID-9 International industrial tractor.
1—Bros pneumatic tired roller.
1—Bros pneumatic tired wobble wheel roller.
3—Unit ½ c.y. shovels.

Drainage Equipment

1—Koehring 301 crane with digging bucket.
1—HD-10 A-C bulldozer.
1—Buckeye 160 trenching machine.
1—Cleveland 95 trenching machine.
1—4" Novo centrifugal pump.

Fertilizing and Seeding Equipment

1—Case tractor.
1—Rock Island tractor.
1—ID-9 International tractor.
1—1937 Chevrolet truck.
1—Brillion Cultipackers.
1—Oliver drill.
1—Minneapolis-Moline drill.
2—Minneapolis-Moline discs.
1—Seaman tiller.
1—Brillion grass seeder.
1—Mount Vernon fertilizer spreader.

Bituminous Pavement

1—Distributor truck.
1—Springfield 10-ton roller.
1—Hercules 10-ton roller.
1—Barber Greene asphalt paver.
1—Hough broom.
5—10 c.y. asphalt semi-trailer trucks.

★ Grading progressed at 25,000 yd. daily

Acknowledgments

Mitchell Field is being developed and operated by Milwaukee County. Thomas F. Cosgrove, Milwaukee county airport engineer, and Thomas Makal, his assistant, were in charge of the project. Joseph D. Bonness was project manager for Jos. D. Bonness, Inc., and Frank Mashuda Co., joint contractors. Under sub-contracts grading was performed by Mashuda-Griffith Co. under supervision of Jack Mashuda and Richard Griffith, paving by Jos. D. Bonness, Inc., under supervision of Jos. D. Bonness and Arthur A. Ruesch, drainage by Koch and Bonness supervised by Tony Koch, batch haul by H. C. Westfahl, and gravel haul by J. F. Lavin.

The drainage tunnel lining is being performed under separate contract by Old Construction Co.

Louisville Adopts Standard Flexible Design for Suburban Streets

When a subdivider or group of home owners in residential Louisville, Kentucky, wants to put in new streets, they must conform to certain minimum pavement standards. The standard flexible-type design (see sketch) calls for a rolled subgrade and 1-in. insulation course, 5½ in. minimum thickness of asphaltic macadam base, placed in two penetration courses, each rolled, plus a 1¼-in. binder course and 1-in. surface course of hot-mixed asphaltic concrete.

Costing about $3.00 per sq. yd. at current high prices, this design, while not being beyond the means of property owners, still insures the city of a durable street that will not require excessive maintenance. Both the minimum quantities per square yard and the minimum thickness of layers are specified, thus doubly assuring a square deal on pavement thickness. W. W. Sanders is chief engineer, J. B. Wilson director, department of public works of Louisville.

MINIMUM QUANTITIES PER SQUARE YARD OF PAVEMENT			
ITEM	MATERIAL	UNIT	QUANTITY
1"-Insulation Course	Crushed Limestone	Pounds	90
5½"-Asphaltic Macadam Base (2 Courses)	Crushed Limestone	Pounds	516
	Asphalt Cement	Gallons	2¾
1¼"-Asphaltic Binder (Intermediate Course)	Asphaltic Binder	Pounds	125
1"-Asphaltic Concrete Surface	Asphaltic Concrete	Pounds	110

County Carries Snow Removal Problems to Citizens

The Gratiot County (Mich.) Road Commission, according to a piece in *Michigan Roads and Construction*, has initiated a policy of placing its snow removal problems squarely before residents.

The Commission, through the county press, is telling the people just what they can expect under varying conditions, and why.

A map showing all county roads has been prepared and published in local newspapers. According to the Commission's plans, certain county trunklines will be first cleared completely in case of severe storms; in milder snow, all roads will first be opened and then the lanes on all roads will be widened.

These main county arteries are clearly indicated on the snow removal map. A statement, accompanying the map, is as follows:

"The Road Commission is desirous of extending every effort that financial conditions will permit in order that snow may be removed from all of the highways upon which people reside. A plan has been decided upon whereby it is felt advisable, in case of severe storms, to give first consideration to the plowing of certain county roads, which in the main comprise the original county road system and the hard-surfaced roads in the county system.

"Last year a great deal of difficulty was encountered in trying to open all of the highways first and then attempting to widen back the snowdrifts as fast as possible. Snow and wind came so often, completely obliterating what had been accomplished, that we were continually working against odds trying to keep a small roadway open through big drifts.

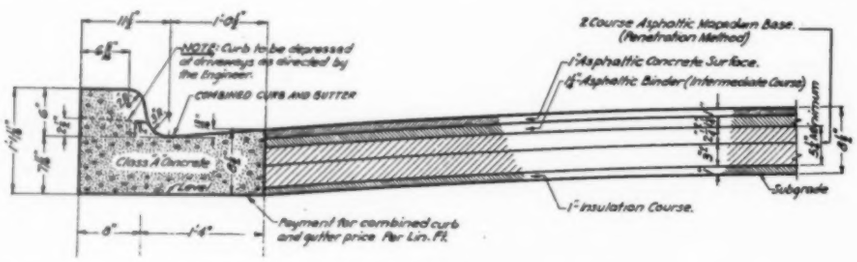
"This year it is proposed to plow out certain roads completely before attempting to open up any additional ones. By widening these roads completely, we will be in a position to keep them open to better satisfy traffic requirements. Then, as finances will permit, the balance of the county roads will be cleared of snow as rapidly as possible.

"Should there be only an occasional storm, it is expected all highways should be plowed within a short time, but should there be conditions similar to that of last winter, it will be necessary to revert to the plan outlined above.

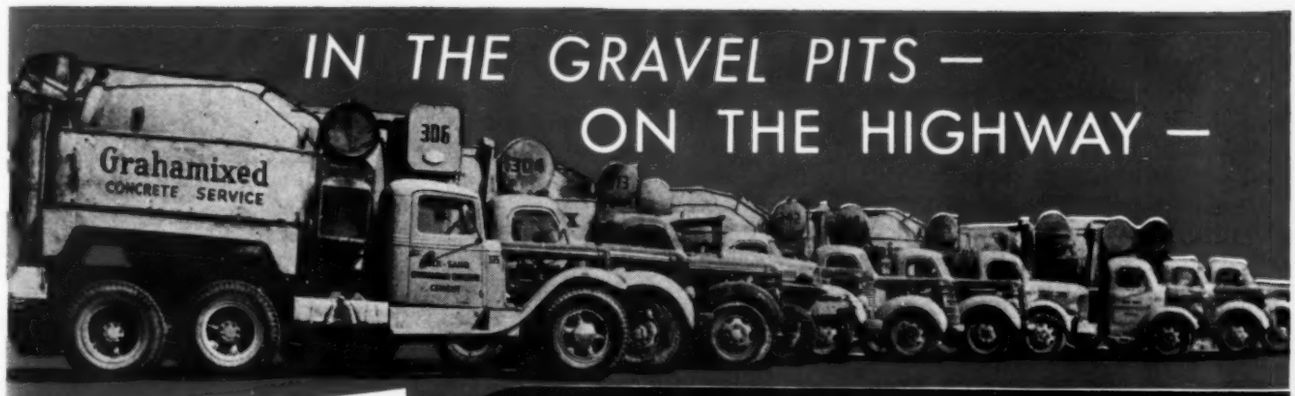
"There has been practically no increase in highway revenues for county road purposes in recent years. For a short period of nearly two years certain revenues from liquor taxes were made available for highway use. After the enactment of the so-called Sales-Tax Diversion Amendment, the legislature saw fit to take the liquor tax money away from the highways and use it for state revenue. The highway organization since 1940 has continually absorbed increased costs of labor, equipment and materials, and has reduced its operations yearly until at the present time county roads very plainly show the result.

"The Road Commission does not feel it will be able financially to pay for the added cost of overtime work except in emergency cases, and should there be a snowstorm on weekends which impedes but does not block traffic, it is doubtful if the snow will be removed at night or on Sunday in order that funds may be conserved in that matter.

"However, should a storm develop during that period which blocks the highways, an effort will be made to open up the main roads as soon as possible."


2 Course Asphaltic Macadam Base. (Penetration Method)
1" Asphaltic Concrete Surface.
1¼" Asphaltic Binder (Intermediate Course)
NOTE: Curb to be depressed at driveways as directed by the Engineer.
COMBINED CURB AND GUTTER
Class A Concrete
1" Insulation Course.
Subgrade
Payment for combined curb and gutter price Per Lin. Ft.

★ Cross section details of 8½-in. minimum thickness residential street pavement required for Louisville subdivision and petition improvements



Tire cost is a major item in our type of operation. For that reason we must hold tire expense to the minimum. We do that by using Firestone All Traction Tires. They are money savers.

PAUL GRAHAM, President
Graham Brothers

IT'S Firestone FOR Graham Brothers of

LOS ANGELES, CALIFORNIA

FIRESTONE builds tires for every load, road and condition of service — tires fitted to the job.

For Graham Brothers in the rock and concrete business in Los Angeles, the tire that fills the bill is the Firestone All Traction. It has the traction for off-the-highway use and the roadability and long life for over-the-highway hauling. And it slashes costs.

The Firestone All Traction will do the same in any hauling operation that demands off-the-highway traction and on-the-highway roadability with long life.

Whatever your hauling job may be you can cut tire costs by equipping your trucks with Firestone Tires fitted for your specific job. Give them a trial. They will prove it.

Copyright, 1948, The Firestone Tire & Rubber Co.

EDITORIAL

★ Shop Fires Always a Danger

The two hundred thousand dollar fire that recently destroyed a division highway maintenance shop in North Carolina, should serve as a fresh reminder to maintenance men that fires are a never ending threat around gasoline and oily waste. The fire in this instance is said to have begun when an electric light cord being used by a mechanic working on a truck, short-circuited and ignited the truck's gas line. Destroyed with the brick veneer building was some $60,000 worth of parts, several hundred tires, and several motor vehicles. A mechanic was burned slightly, but luckily there was no loss of life.

As the highway department's own employee publication put it, hindsight is usually easier than foresight, and it is easy to assign reasons for a fire, once it has occurred. When a fire hasn't taken place for some time, it is also easy to imagine that everything is hunkydory and to be convinced that a fire "couldn't happen here." Most garages today have concrete floors, firesafe walls, and conventional fire fighting or safeguarding facilities. The main thing to remember is that even the most modern garage, such as several highway departments are planning or building today, is only as safe as the employees are vigilant. Conscious watchfulness must begin every morning with the donning of the work clothes, and last all day. It helps, too, of course, to keep everyone drilled on a list of the most common hazards and safety rules. Plan your safety, work your plan.

★ Congratulations, New Jersey

An old joke has it that the Brooklyn bridge is sold over and over again.

If only people were that easily sold on other examples of public works—limited access highways, for example. We have commented repeatedly in these columns on the staggering complexity of metropolitan-type expressways, in their economic and planning aspects, and on the new order of public relations work needed to reduce their complexities to facts for the man on the street and at the wheel.

During the past year the high type of leadership so urgently needed here has begun to emerge. The job done in California is one example, and similar efforts at visualization and interpretation of planning data have been tackled in certain other states. Now comes another splendid example which should be studied by all—the booklet prepared by the New Jersey state highway department entitled "New Jersey's First Parkway—Route 4." Congratulations, Commissioner Miller, Chief Engineer Noble and staff. This picture-and-chart story of facts vital to the future growth of a state is told clearly, quickly, convincingly.

The techniques used in this booklet should be applied in other areas by specialists as part of the growing emphasis on long-range planning of roads of all classes.

★ English Note on Expressway Progress

The need for motor expressways is being felt in heavily peopled areas throughout the world. An example of the growing interest in the problem is that voiced by the British technical periodical, *Municipal Engineering*, whose editors recently devoted considerable space to a review of Houston's expressway plans, as outlined in June '47 R & S. A digest of the main points in the Houston program was prefaced by the statement that while economic conditions in Great Britain limit the prospect of immediate construction of motorways, road engineers will contiue to give attention to features of similar trafficways in the United States, "where there is great activity in road construction and improvement".

Texas highway department engineers at Houston can take a bow especially for the editorial comment at the close of this summary, which said that "this account of the method of providing for piers in the form of groups of columns on footings at the requisite depths [under-reamed or belled footing holes, power-bored through clay and concrete filled], will favorably impress British engineers, with regard to its economy and efficiency."

★ State Highway Publications

It's too bad so much money is wasted by a few state highway departments on those little monthly "magazines." Some have no apparent purpose—just plain aimless. Others are obviously intended to glorify someone in the state government who must stay elected. Only two or three we can think of summarize projects constructively or present good technical discussion for engineering and maintenance employees, or serve as real inter-office morale builders for clerical and office workers. This latter type of organ, by the way, must be edited with considerable skill as to policy, or be worse than useless, as industrial firms have found; no gossip, go easy on "personals"; drop the whole thing if it takes the place of adequate pay, chances for advancement, reward of merit and administrative leadership.

★ Good D.P.W. Public Relations

Snow and ice equipment is still woefully lacking in many cities located in the "it could happen here" belt. City councilmen being human and vote-wary are not easily sold on granting the large sums needed to provide modern trucks, plows, loaders, sanders and other equipment required to meet serious emergencies.

The best time to get action on new equipment, of course, is just after a particularly bad storm; Milwaukee city leaders, for example, after the storm disaster of January, 1947, voted a large appropriation for new trucks and other units.

Next best time to spotlight the need is when a big storm has hit a neighboring city. Then is also a good time to urge cooperation by citizens in event of a local storm, and to win favorable public opinion on the efficiency of your present winter program—that is, if you can claim efficiency.

A splendid example of the latter-type of well-timed publicity is the news editorial recently published in Washington, D. C., and reproduced in the Public Works Engineers' "News Letter." Praising Sanitation Commissioner William A. Xanten for being on the job in storms the previous winter and making a relatively small equipment fleet go a long way, it warned citizens not to depend entirely on city forces but to cooperate. It closed with the admonition: "If snow falls, don't wait on the city to clear your streets [and walks]. Get in there and do some work yourself. Otherwise you may find New York's very real disaster repeated here. No need for it."

★ 1948 Resolutions: Maintain Your Shoulders!

Thousands of miles of busy arterial road pavements are still flanked with death dealing ruts. Slab edges are exposed either intermittently or almost constantly. Combined with a program of graveling, armor-coating or pavement widening where needed most, the answer is quicker patroling during and after rainy weather and more frequent attention between rains. The final answer, as one maintenance chief notes, calls for more funds, better equipment, on-their-toes employees and a green light from the chief. Equipment manufacturers now offer an array of attachments and self-powered units that will help speed up this vitally important (and never-ending) job, and save labor and stretch maintenance funds in the process. Shown here is some of the equipment seen by the R & S editors in recent months.

Ohio — (right): Along US 35 near Eaton, Ohio, where an excellent job was being done to keep the gravel well spread along the pavement elge. Just a box with diagonal and straight blades, equipped with wheels so that it can be dropped to road contact for towing over the road, by turning the axle through 180 degrees and locking it

Michigan — (lower left): This state's forces use a variety of equipment on shoulder work, and are among the most alert and systematic in battling slab-edge ruts. Here the boys are out immediately after an autumn rain.

Location of upper left scene not identified, but we're including it here as another example of how a wide variety of available equipment can be adapted for shoulder maintenance.

...Le Roi announces the Model 52 Paving Breaker

...its new, easy-holding action packs a wallop that saves you money

Here's a new paving breaker that you must try. Our tests, and they've been tough, indicate that this machine reduces the cost of breaking concrete. The 52 is truly a champion — these features guarantee it:

● **A knock-out punch that puts "high costs" down for the count.** Le Roi's 52 breaker has a happy combination of bore, stroke, valving, and timing that produces its highly effective concrete-shattering blow.

● **Easy to handle.** The 52 weighs 80½ pounds. Overall length is only 29 inches, and handle width 15 inches — operators can move it around with less effort. Rubber hand grips, a new valve action, and an air-cushioned front end minimize vibration. A latch-type retainer makes steel-changing easy.

● **A bear for punishment.** Sturdy drop forgings are used throughout. The throttle valve has a replaceable bronze bushing. The slug-type piston is reversible, a feature that adds many hours of operation to its life. A generous oil reservoir and a new type of lubrication system helps maintain peak operating efficiency — *the 52 is the first breaker to introduce positive shank oiling to increase chuck-bushing life.* A generous bearing giving full support for the full length of the tappet stroke, maintains alignment, and eliminates tappet spalling. A swivel hose connection increases the life of the hose.

● **A miser when it comes to using air.** You can run Le Roi's Model 52 off any standard 60-foot compressor. The 52's new end-seating valve meters the air sparingly without weakening the force of blow — and it actually improves with use, assuring efficient dependability.

The frost will be out of the ground before long — so see your Le Roi distributor about delivery of Model 52's for your spring work.

Write us for literature.

SPECIFICATIONS

Weight, lbs.	80½
Length, inches	29
Width, inches	15
Standard Shank size, inches	1¼ x 6*

*1⅛" x 6" shank also available. Sheeting driver frontheads can be supplied for 2, 2½, and 3-inch piling. Spike driver frontheads are also obtainable.

LE ROI COMPANY

MILWAUKEE 14, WISCONSIN

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TULSA • BUTTE • SAN FRANCISCO

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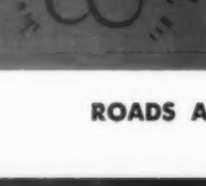


Take a round out of pavement-breaking costs with LE ROI'S New 52

American Road Builders Hold Winter Conference

Good outlook for continued large-scale Federal aid emphasized by Congressional leaders; plans for big Road Show in Chicago revealed to be well advanced; new attention to the utilization of modern equipment shown in committee plans, which re-emphasize unique function of the ARBA in cutting across professional and industry lines

AS we see it, at least three important developments ought to be underscored in telling what transpired at the American Road Builders' Association Conference in Washington, D. C., Jan. 26-28.

First and foremost, the Conference served as an occasion for several top Washington figures, including no less than Joe Martin, speaker of the House, to assure us of the continuation of broad-scale federal highway aid programs. With hearings under way now on various bills for extension of the federal highway program to 1951, these leaders reflected public realization of the key importance of road development in our national economy. Terming highways as part of the production lines of our factories, Speaker Martin said, "A large-scale program of replacements and modernization in addition to routine maintenance is essential."

Road Show Plans

Secondly, the ARBA delegates were shown in some detail that plans for the Road Show in Chicago next summer are well advanced and that hundreds of individuals on various committees are devoting time to help assure the complete success of this "unprecedented" show. We use this $64 word advisedly because 720,000 sq. ft. of exhibit space had been contracted up to Jan. 26, and the remaining 50,000 sq. ft. was expected to be gone soon. "Over 20 Football Fields of Road Show" is the headline for the opening advertisement in a strong promotional campaign now under way, directed by a committee under H. A. Scribner of Russell T. Gray, Inc., Chicago.

Thirdly, if we may single out another conference development, is the new light thrown on the importance of modern power machinery in road building. PRA Commissioner Thos. H. MacDonald before the general session said that "power equipment and the rate at which its use is expanded on highway work has become the most important factor in production." How important a part equipment now plays in road construction is demonstrated by a recent PRA study of the equipment used on a large sample of Federal-aid projects. Project value for these projects aggregated $20 million. Total equipment investment, based on 1946 purchase prices for new machines, was $18 million, or 90% of the value of the contracts. This typical percentage has risen in a decade from 50%.

The major equipment employed on the projects in this study included 850 trucks, 365 tractor-scraper-dozer units, 116 shovel-draglines, 70 tractor-wagon units; 25 crushing and screening plants, 40 pavers and auxiliary paving equipment outfits, 120 motor graders, and 73 flat rollers.

Other significant points in Commissioner MacDonald's paper are:

1. Highway construction cannot go ahead much faster than the equipment industry can keep up with replacements and repair parts.

2. The study spotlights the folly of assuming that highway construction can be turned on or off like a spigot, as sometimes advocated by work-relief thinkers. No contractor can afford the large capital outlay for equipment unless reasonably assured of a steady continuing highway program under which he can bid for jobs. Contractors' investment in highway machinery must be regarded as a capital accumulation which must be kept working if the public interest is to be served.

3. Keeping the highway construction plant in operating condition is a public service, not to be subjected to uncertain policies or casual timing. Since certain physical limitations, rather than financing and administrative considerations, finally determine the possible volume of road construction, officials at all government levels should consider readjustment of the regulations, specifications and design of work to get maximum work accomplished. Projects should be divided into contracts requiring single rather than multiple-type operations, is the Commissioner's belief.

4. Joint conferences in each state between contractors and other suppliers and the state and federal highway departments are advocated, to help arrive at a conservative conclusion as to the production that can be achieved during 1948 without a material increase in the price index.

The importance of such cooperation is seen in the fact that 27% of all 1947 Federal-aid contracts showed unsatisfactory progress. Poor management was the reason assigned in 31% of the cases, and weather and miscellaneous accounted for 18%. But shortages of materials, labor or equipment was a factor in 51% of the poor showings.

5. Commissioner MacDonald foresees no easing of conditions in the construction industry soon. Rather than to try to expand the rate of lettings at current prices, he believes we "should place our greatest reliance for the immediate future upon intensive maintenance to keep our highway plant in operation."

Rising Maintenance Need

The rising importance of maintenance in the over-all highway picture was shown by another recent PRA fact-finding job. As reported by Deputy Commissioner J. S. Bright, maintenance costs have risen faster than

construction costs, until in 1947 maintenance for all classes of highways totaled an estimated $967,000,000, approaching the $1,217,000,000 reported construction expenditure for the same year. In the decade 1921-30, for each dollar of construction expenses, 29 cents went for maintenance on state highways and 82 cents in the case of county and local roads. In the decade 1931-40 these figures rose to 36 cents and $1.47, respectively, and during the 1941-46 period to 72 cents and $2.66, respectively, per dollar of construction. Considering county and local roads alone, maintenance work has tripled in dollar volume in the past five years, and was almost double the construction volume in 1947. This trend is due not only to rising prices, but to growing traffic use and deferments of needed construction.

Takes More Equipment

As part of this PRA study, twenty-eight counties were asked to report detailed data on road mileages, equipment inventories and maintenance expenditures. It was found that $7.7 million in equipment (cost new) was required to perform $6 million worth of maintenance work on county roads in 1947, a ratio of $1.28. [These counties were selected as being unusually efficient. Possibly the maintenance ratio is much higher in less efficient counties—Ed.]

Equipment inventories of state highway departments, by way of comparison, totaled $365 million last year, and $356 million in state highway maintenance was performed in 1947, giving a ratio of 1.02 according to Mr. Bright.

Many Valuable Papers

The three-day program of the Conference was packed with well-prepared papers and committee reports, some of which will be reviewed in subsequent issues of ROADS AND STREETS.

President Calloway Invited Group Cooperation

In his annual address, ARBA president J. T. Calloway outlined in inspiring terms the magnitude and significance of the Road Show next summer in Chicago. In tracing the influences that have brought about our progress in highway development, he paid tribute to the many organizations that have contributed, and invited them to share in making the show a success. Among these are the Public Roads Administration of the Federal Works Agency, American Association of State Highway Officials, United States Chamber of Commerce, Civil Aeronautics Administration, National Association of State Aviation Officials, Highway Research Board, National Highway Users Conference, American Trucking Association, National Association of Rural Letter Carriers, Associated General Contractors of America, Inc., and the Associated Equipment Distributors.

Important Resolutions

Resolutions passed at the ARBA conference included three which:

(1) Reaffirmed the Associations' endorsement of the contract system of road construction, as a means of encouraging private initiative;

(2) Urged continuation of the Federal-aid highway program on a basis of at least $800,000,000 annually, in the belief that an increase over the present half-billion-annual program is necessary;

(3) Urged that the ARBA continue its nationwide campaign to aid in getting better salaries for state, county, and city highway department personnel.

ARBA Officers for 1948

Pres.—J. T. Calloway of Chicago (re-elected).

Treas.—Capt. H. C. Whitehurst, director of highways, District of Columbia (re-elected).

Vice-Presidents—Paul B. Reinhold of Atlas Equipment Corporation, Pittsburgh, Pa., Charles W. Smith, of Smith Engineering and Construction Co., Pensacola, Fla., W. A. Roberts, vice-president, Allis-Chalmers Mfg. Co., Milwaukee (foregoing re-elected); T. E. Stanton, materials and research engineer, California Department of Public Works, Sacramento.

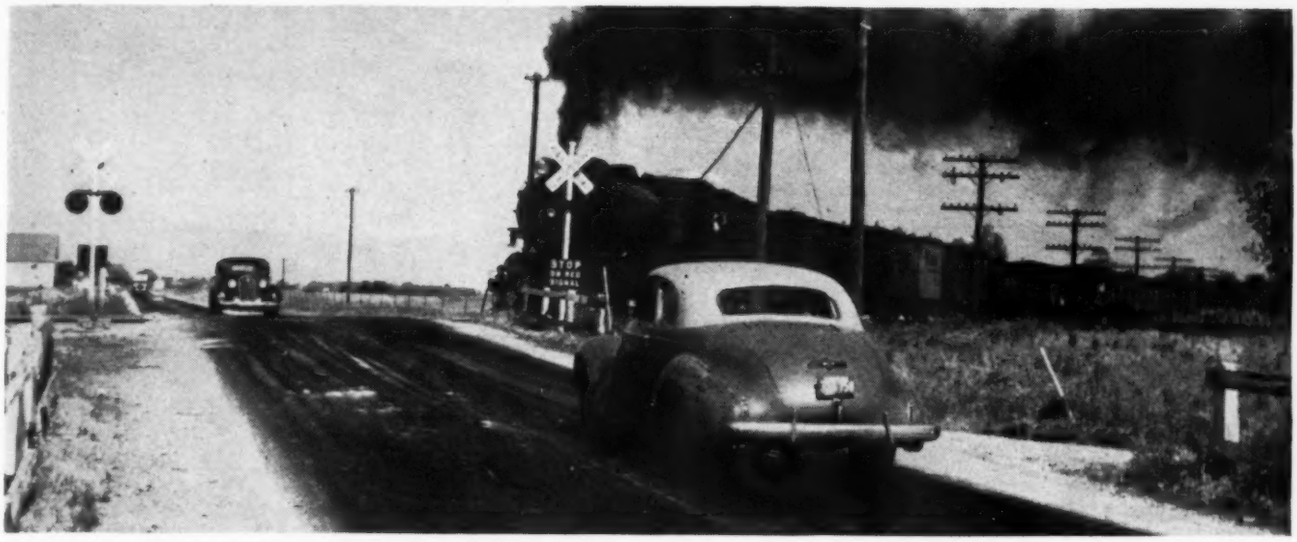
Directors (term ending 1951)—Edgar J. Buttenheim, publisher, *Contractors and Engineers Monthly*, New York, T. H. Cutler, chief engineer, Kentucky Department of Highways, Edward S. Gillette, publisher, *Roads and Streets*, Chicago; Otto S. Hess, engineer-manager, Kent County Road Commission, Grand Rapids, Mich.; Howard R. Meeker, president, J. D. Adams Company, Indianapolis; Charles M. Noble, State Highway Engineer of New Jersey; Murray D. Shaffer, Director of Highways of Ohio, Columbus, Ohio.

Airport Division—Jennings Randolph, former Congressman from W. Virginia and now asst. to the pres., Capital Airlines, Washington, D. C., was elected president of the Airport Division to succeed Maj. Gen. Julian L. Schley, Baltimore.

Regional vice-presidents re-elected: E. R. Needles, consulting engineer, New York, Asa Rountree, Alabama Aeronautics Commission; Clarence F. Cornish, Aeronautics Commission, Indianapolis; B. Herndon, Louisiana Aeronautics Division; I. V. Packard, of I. V. Packard Air Activities, Hast-

(*Continued on page* 116)

"SEE YOU AT THE ROAD SHOW IN CHICAGO JULY 16-20!"



★ Road programs are at a new high level, dollarwise, but still far short of the pace necessary to catch up with U.S. highway modernization. Hundreds of dangerous rail-arterial grade crossings, to cite one example, are still waiting to be eliminated. (Photo by R&S Editor)

1½ Billion for Roads in '48

- **Presenting a national summary, plus high-light reports from several state highway engineers**
- **Inflation a serious threat, continued engineer shortage a chief problem**
- **Programmed highway expenditures are rising to new postwar levels, but pace is still far short of need as motor vehicle travel reaches new peaks**

THE year 1947 can be marked down as the one in which postwar roadbuilding began to hit its stride.

In that year many contractors showed old-time speed in spite of adverse weather, continued shortages and indifferent labor attitude.

Highway construction by all government levels according to Federal Works Agency figures reached $1,200 millions, compared with $706 millions in 1946. Only urban projects lagged, due to right-of-way and other problems.

Eight states raised their gasoline taxes, but by and large little was done to even begin to increase highway revenues to match inflated costs. Construction costs for various classes of road work have risen 180 to 193% above 1940 costs, and high costs obviously have seriously reduced the mileage of roads that can be improved soon. Some officials are considering postponement of large projects, but most leaders seem determined to push on with plans, with the realization that delay in solving congestion is a more costly alternative to the public. The facts show that a $3,000 to $4,000 million dollar annual road program is a necessity for many years if highway engineers are to catch up with the job.

1948 a Big Year

Official forecasts for 1948 highway construction put the expected outlay at $1,500 millions. Reviewing the progress of the highway program, Public Roads Commissioner Thomas H. MacDonald said contract awards authorized by the States during the past year called for $895,000,000 worth of work on 44,700 miles of road, some $150,000,000 up from 1946. This included $640 millions for 19,800 miles of Federal-aid projects.

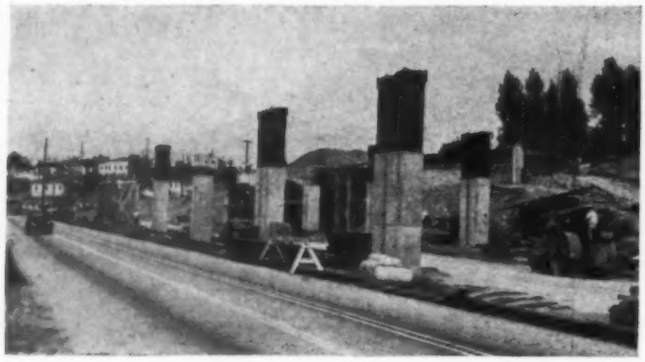
Expenditures for state-administered highway work under way during the year amounted to approximately $890,000,000. At year's end, Federal-aid projects for more than $700,000,000 were under construction, and plans were approved for $350,000,000 additional projects on which work is expected to start this year. The total estimated cost of Federal-aid projects programmed by the States for construction but not yet advanced beyond the planning stage was nearing $750,000,000.

Traffic All-Time High

The urgent need for better highways throughout the Nation was emphasized by steadily mounting floods of traffic on main rural roads and urban thoroughfares.

Motor vehicle registrations in 1947 are estimated to have exceeded 37,000,000, setting an all-time record. This was 3,200,000 more than the 1946 total and 2,644,000 above the number of motor vehicles registered in 1941, the previous peak year. Travel

10,120 Highway Projects Let—During the 11 months, January through November, 1947, state highway departments placed 10,120 projects under contract, the work covering 42,422 miles of highway. The cost was $832,033,000 of which Federal funds amounted to $312,938,000.



★ Los Angeles continues to lead the nation in construction progress on urban expressways. These scenes taken by the R&S Editor, summer, 1947, along path of Harbor Parkway and Hollywood Parkway

on rural highways during the year was estimated at 187 billion vehicle-miles, some 10% up from 1941.

The increasing use of highways for commercial transportation was reflected in the fact that truck registrations rose from 4,859,244 in 1941 to an estimated 6,500,000 in 1947, increase of 33.7%. The increase over the 1946 total of 5,725,692 was 13.5%.

Truck-hauling on rural roads during the past year was estimated at 86 billion ton-miles, as compared with 73.5 billion ton-miles in 1946.

Urban Needs Faced

With traffic congestion steadily becoming more serious, one of the most important developments in 1947 from the standpoint of the average motorist was the designation of a 40,000-mile interstate system of highways which eventually will be improved to high standards. The system includes routes carrying large volumes of traffic into and through cities.

Commendable progress was made by the States, in cooperation with municipal authorities, in the planning and actual start of construction on expressways designed to speed the flow of traffic in urban areas and at the same time reduce accident hazards.

Work was begun during the year on urban expressways and multi-lane rural highways in Massachusetts, Connecticut, New York, New Jersey, Pennsylvania, the District of Columbia, Florida, Ohio, Texas and California. In other States plans for expressway projects were well advanced and initial contracts are expected to be let in the near future.

Progress on urban Federal-aid highway construction has lagged, however. Only 32% of postwar F. A. highway funds were under contract as of Oct. 1, the projects representing $934,000,000, including matching funds.

Following are several state summaries prepared specially for "Roads and Streets":

New York Awarded 445 Miles in '47

By B. D. Tallamy
Chief Engineer, New York State Department of Public Works, Albany

Despite close adherence to its "hold-the-price-line" policy, the New York State Department of Public Works was able to award 118 contracts having a combined bid price of $52,000,000 in the past year. These projects provided for a total of 455 miles of highway and bridge construction. Department maintenance forces resurfaced another 235 miles.

During that same twelve month period the department presented to the mayors of their respective cities, master plans for urban arterial route construction in Rochester, Syracuse, Rome, Corning, Poughkeepsie and Binghamton, bringing to eight the number of urban areas for which master plans have now been completed. Traffic studies, including origin-destination surveys, were made in 28 more cities of New York State last year, leaving only 14 of the state's 62 cities still to be surveyed. Reports for the remaining 40 cities in which surveys have already been taken are in various stages of completion and several will be ready for presentation during the early months of 1948.

Work accomplished in 1947 included projects involving reconstruction of presently outmoded sections of the state highway system, additional grading and bridge construction projects on the Thruway, urban arterial route work and several projects on the newly mapped federal-aid secondary system.

In order to expedite the construction of two badly needed large bridge structures, the Department adopted a policy of awarding separate contracts for foundations, superstructures and pavements. By so doing it has been able to progress on each, with the initial steel work following closely upon the heels of foundation and pier completion.

The full scope of New York State's highway construction activities in 1948 cannot be forecast until the extent of appropriations to be granted by the Legislature for such work can be ascertained.

N. Carolina Has Record Program

By W. Vance Baise
State Highway Engineer of N. Carolina, Raleigh

North Carolina in 1946 and 1947 carried on the largest construction and maintenance program of any two-year period since it was organized. During 1946, new construction contracts totaled $21,503,499 (1766.6 miles of roads). Stabilization and improvement work performed that year with State forces and equipment cost $11,580,925. Total $33,084,424.

About $17,000,000 was spent on maintenance of the state and county road system, involving 61,500 miles.

During 1947, contracts involved $27,086,509 (1351.7 miles). We also improved with some type hard surfacing, using state forces and equipment, 744 miles of secondary roads at cost of $13,110,762, and retreated with drag seal or other type asphalt 1468 miles at a cost of $1,818,421. During 1947 maintenance approximated $18,500,000. Total $60,515,700.

ditchdigger

backfiller

loader

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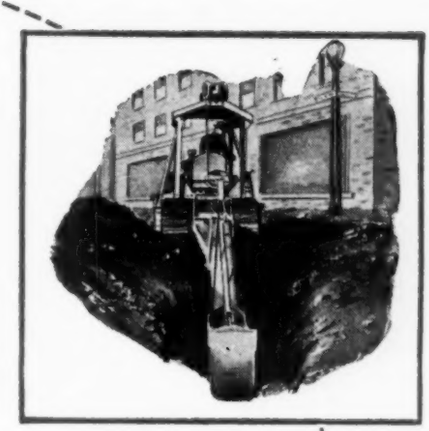

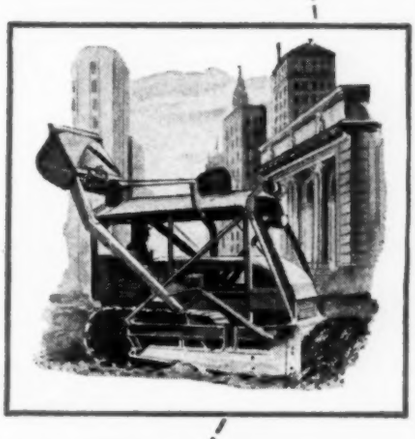

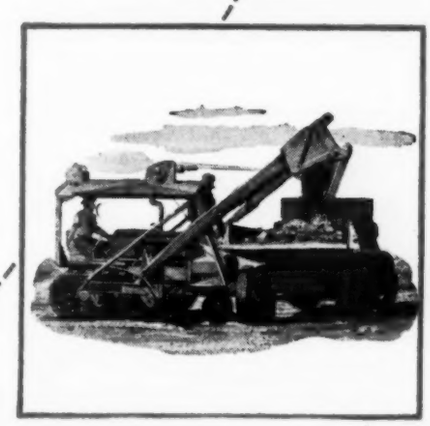

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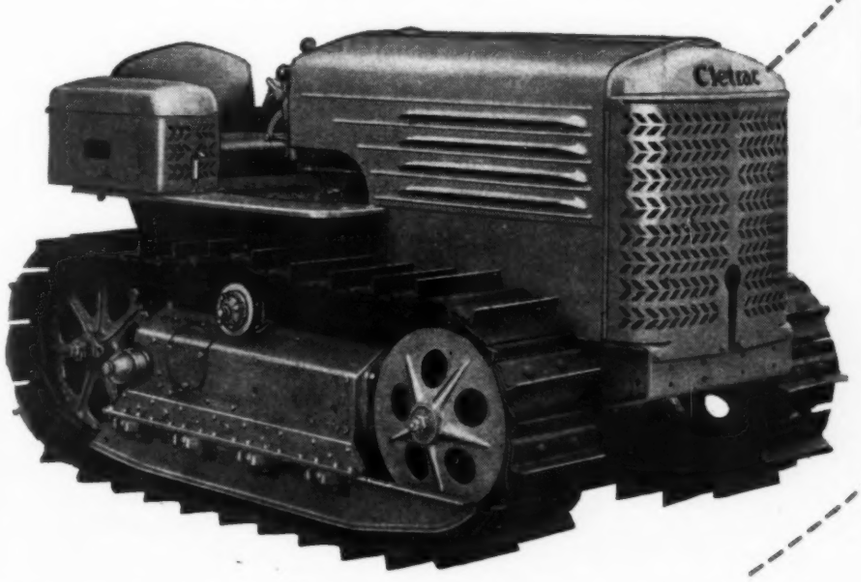

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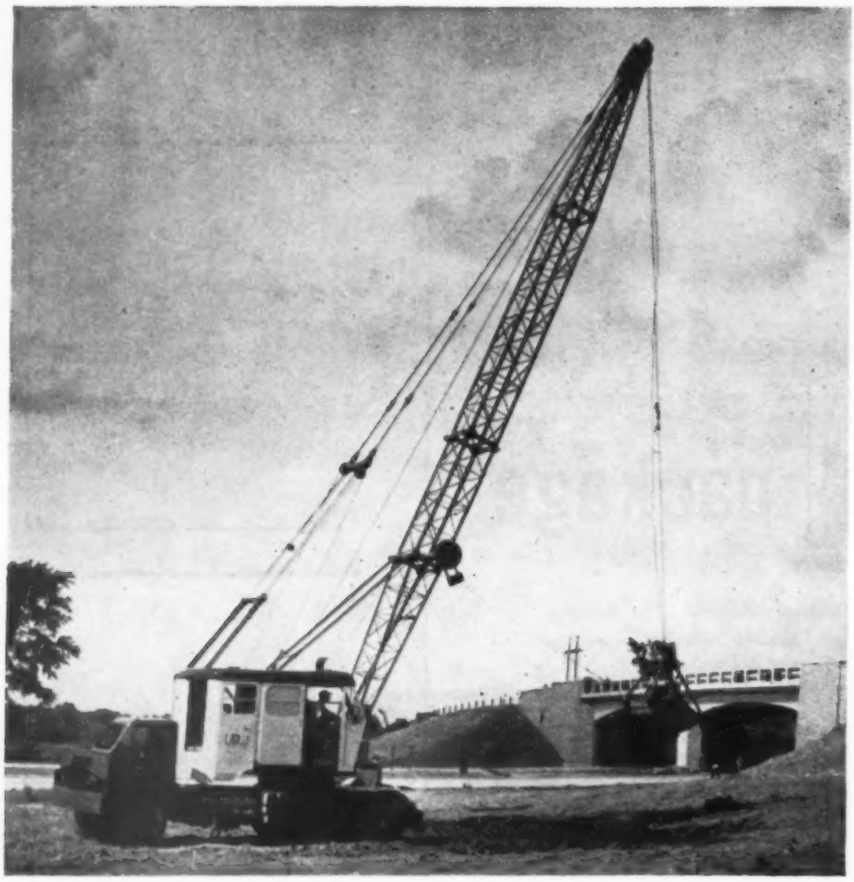

★ Among the outstanding highway projects completed in 1947 was a section of Connecticut's Wilbur Cross Highway. L. G. Defelice & Sons, Inc., completed three consecutive contracts totaling 10 miles of modern 4-lane limited-access roadway, and including numerous grade separation structures of pleasing and varied architectural design

The past year has been the largest in both construction and maintenance in the history of this Commission. Since the war there has been a heavy demand for the improvement of secondary roads, and as result, emphasis has been placed on the improvement of the secondary system. More than 2600 miles of secondary and farm-to-market roads were hard-surfaced, and many thousands of additional miles were stabilized with crushed stone, gravel, top soil, or sand, so as to make them all-weather even though not dustless.

The State has about kept pace with the utilization of Federal-aid primary and secondary funds, available under the 1944 Federal-aid Act. But in addition to the secondary Federal-aid funds, including state funds to match, it has expended several millions of state surplus funds on the secondary system. Total expenditure for the improvement of the secondary system, since the war, has been approximately $50,000,000, not including maintenance expenditures. The only phase of our Federal-aid construction program behind at this time is the Urban. This is due to complications in securing right-of-way and other urban problems, which resulted in very slow progress. However, very good progress is now being made on several urban projects. Plans are well under way, and contracts may be let soon.

Big Arterial Job

While the greatest emphasis has been placed on improvement of the secondary farm-to-market system, we realize that our primary system is in very great need of improvement, since many main routes were built in pioneer days of highway construction, and it was necessary to abandon much construction work during the war.

It will be necessary to expend, within the next few years, a very large sum to bring the primary system up to standards. The greatest bottleneck is the difficulty in securing sufficient qualified engineering personnel.

We have been very badly undermanned for competent engineering supervision, and it has, therefore, been necessary to do a considerable volume of the work with State forces and equipment where the roads had already been fairly well laid out, thus eliminating the necessity of much engineering supervision.

The department has been fortunate in having several practical construction men, who have carried on a good job of improving the secondary roads where they did not require detailed surveys and plans.

The entire back-log of plans prepared during the war has now been used, and for this reason it will not be possible for us to let as much contract work during 1948 as during the past year. We hope to be able to let $20,000,000 to $22,000,000 of work, and to be able to handle between $11,000,000 and $13,000,000 of work with State forces and equipment.

New Jersey Focuses on Urban Problems

By Charles M. Noble

State Highway Engineer of New Jersey

In 1947, this Department completed projects costing $7,610,294. These included 11 bridges, 5.5 miles of multiple-lane grading projects (8 lane dual-dual and 6 lane dual) and 19.5 miles of two-lane and multiple-lane paving. The latter including the initial section of New Jersey's first 8-lane dual-dual highway, with new type overhead illuminated directional signing.

The highway department also contracted for $24,668,000 in highway projects during 1947. These involve 32 bridges, 14 miles of multiple-lane grading, and 13 miles of multiple-lane paving.

Projects for state-aid to counties and municipalities involved completion of 231 miles, costing $3,910,000; incorporated, 52 miles, at $1,489,000. This aid was increased from an annual amount of $9,885,000 to $14,875,000.

From Jan. 1 to June 30, 1948, it is planned to advertise $27,830,000 in new highway projects. A large number are on the new Parkway and Freeway program, construction of which is being prosecuted for traffic relief in the northern metropolitan area of New Jersey.

The department in 1947, completed an origin-destination survey of the Camden area, similar to the Newark survey of 1946. The Camden survey was made in cooperation with the Pennsylvania highway department which was engaged in a similar sur-

vey of the Philadelphia area. These surveys involved PRA participation.

Planning Stepped Up

Highway planning and programing utilizing factual data obtained from the highway planning surveys have been continued and strengthened. A joint research project was inaugurated with Rutgers University (and PRA participation) covering pavement performance in relation to soil types and vibratory compaction of soils.

An important postwar change of policy is noted. Formerly a large portion of state highway revenues was devoted to the construction of roads in rural or suburban areas. The fact is now recognized that urban areas are for the most part unable to solve their traffic problems and by reason of this are subject to the congestion and confusion caused by the mixture of local traffic and through traffic on city streets unable to serve this traffic. Some of these cities have shown a population loss, which may be attributed to this congestion.

The State of New Jersey has now embarked on a program to give traffic relief to such cities as Trenton, Camden, New Brunswick, Newark, Jersey City, Bayonne and Elizabeth. The program will also afford relief to 32 smaller municipalities. A section of the Trenton relief project is about to be advertised and first-stage construction of the Bayonne project is proposed for 1948. Studies are under way for the remaining cities.

A major piece of highway legislation passed during the year provides for a Freeway from the projected Delaware River Bridge near Wilmington to a connection in Middlesex County, N. J., with Route 100 Freeway now under construction. This route, together with Route 100, when completed, will provide a controlled access highway—of the dual roadway grade separated expressway type—from the new Delaware River bridge to the George Washington Bridge at New York, with connections leading to the Camden Bridge, Outerbridge Crossing, Goethals Bridge and the Holland and Lincoln Tunnels.

Oregon Program in Full Stride

By R. H. Baldock
State Highway Engineer of Oregon, Salem

In Oregon, during 1947, contract awards for construction on Federal-aid highways totaled $14,000,000, of which $12,400,000 was for projects in the 3-year postwar Federal-aid program, and $1,600,000 was for non-cooperative state projects. Expenditures on construction projects during the same period amounted to $13,000,000.

The $12,400,000 contracted is 33% of the State's 3-year postwar Federal-aid program of $37,400,000. It brings to $25,200,000 or 67.5%, the portion of this program under contract as of the end of 1947. Thus, it appears that Oregon is in full stride in its program of Federal-aid work and will be ready to begin the contracting of a second postwar Federal-aid program by January of next year.

Construction work under contract and unperformed as of January 1, 1948, amounts to $10,700,000. Schedules call for the contracting of an additional $16,500,000 during 1948.

Difficulties with which contractors are confronted appear to have eased considerably during recent months and contractors are bidding more freely than during the early part of 1947. Construction costs appear to be reasonably stable at present with no noticeable tendency either up or down.

Income from motor vehicle revenues of all kinds during 1947 was 20% above the 1946 income. In Oregon, most of this increase went to the counties, cities and state police. Income to the State Highway Commission increased from $18,600,000 in 1946 to $19,800,000 in 1947.

The largest project completed in 1947 was the 10.4-mile relocation of a section of U. S. Highway 99-E between Salem and Albany. This $1,560,000 project involved bridge over the Santiam River, grade separation viaduct, grading to 50-ft. width and concrete paving and rock shoulder.

Among the larger of the projects contracted during 1947 are the following:

(1). 6.07 miles of hydraulicly dredged roadbed embankment with quarry-run rock topping 44 ft. in width; U. S. 30, east of Portland. Estimate $1,470,000.

(2). 39 miles of relocation, U. S. 97, from 25 to 64 miles north of Klamath Falls. Roadbed grading, surfacing 10-in. rock base 34 ft. wide 22 ft. oil mat surface. Estimate $1,550,000.

(3). 12.7 miles relocation on U. S. 99 midway between Roseburg and Grants Pass. Grading and rock base, $1,300,000.

(4). 0.69 mile of arterial highway on Harbor Drive, City of Portland. This 4-lane project consisting of grading, paving, grade separation and traffic interchanges; estimate $1,070,000.

Additional summaries by state highway leaders will be presented in the March issue of "Roads and Streets."

●

State Gas Tax Collections Increase—Gas tax collections in Iowa totaled $30,813,651 during 1947, an unpredicted all time high and $2.5 million over the previous high in 1946. In Montana, 1947 collections were up $1,036,470 to a total of $9,221,998—more than half, by far, of the state's overall tax collections of $15,702,041.

★ Control of excess axle loads is one of the serious operating problems yet unsolved in some states. A joint project was begun in Pennsylvania in 1947, to determine the extent of pavement damage caused by heavy trucks, as an aid in working out an acceptable formula for truck taxation. This scene shows a county inspector giving a surprise Loadometer check to a logging truck in Oregon, where logging loads have been a serious problem

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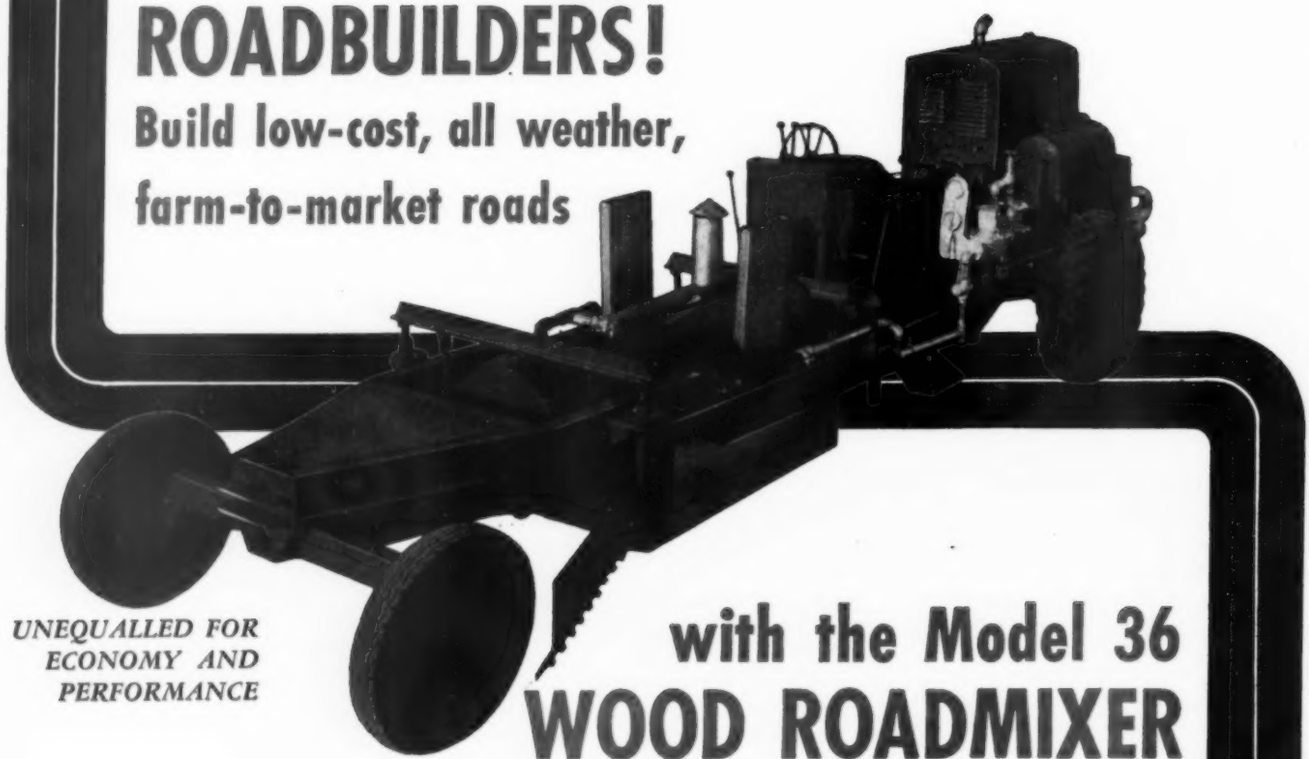

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Arizona Relocation Involved

100,000-yd. Granite Cut

Orr & Orr Construction Co. crew carved 3.3-mile realignment on famous Superior-Miami leg of U.S. 60-70 in the copper country

THE granite was the hardest and toughest "in all Arizona" and the temperature was "hotter'n hell." Army jeeps hauled workers down precipitous pilot roads and along cliff-side ledges to begin work. But nobody grumbled, and by mid-summer, 1947, most of the grading and surfacing was done for one of the West's most spectacular postwar mountain road relocations—U. S. 60 and 70 from the Pinal-Gila county line in Arizona eastward toward the town of Miami. The work was part of an eventual 60-mph, $700,000-per-mile line to extend 90 miles from Globe toward Phoenix.

Orr & Orr, Phoenix contractors, had previously built sections at either end of this project, which comprises 3.3 miles of grade that saves 1.3 miles of distance compared with the old winding road. The new 40-ft. paved roadway eliminates 61 sharp curves; has 6 deg. max. curves and 6% max. grades. The 3,000 daily traffic flow eventually can traverse this route with speed and safety where winter tie-ups and year-around hazard made life adventurous indeed. Opening of the new route awaits completion of one large bridge, a 176-ft. steel arch wide side spans and abutments, the masonry work of which is now progressing under a separate contract awarded to H. J. Hagen of Globe.

Tough Pilot Road Job

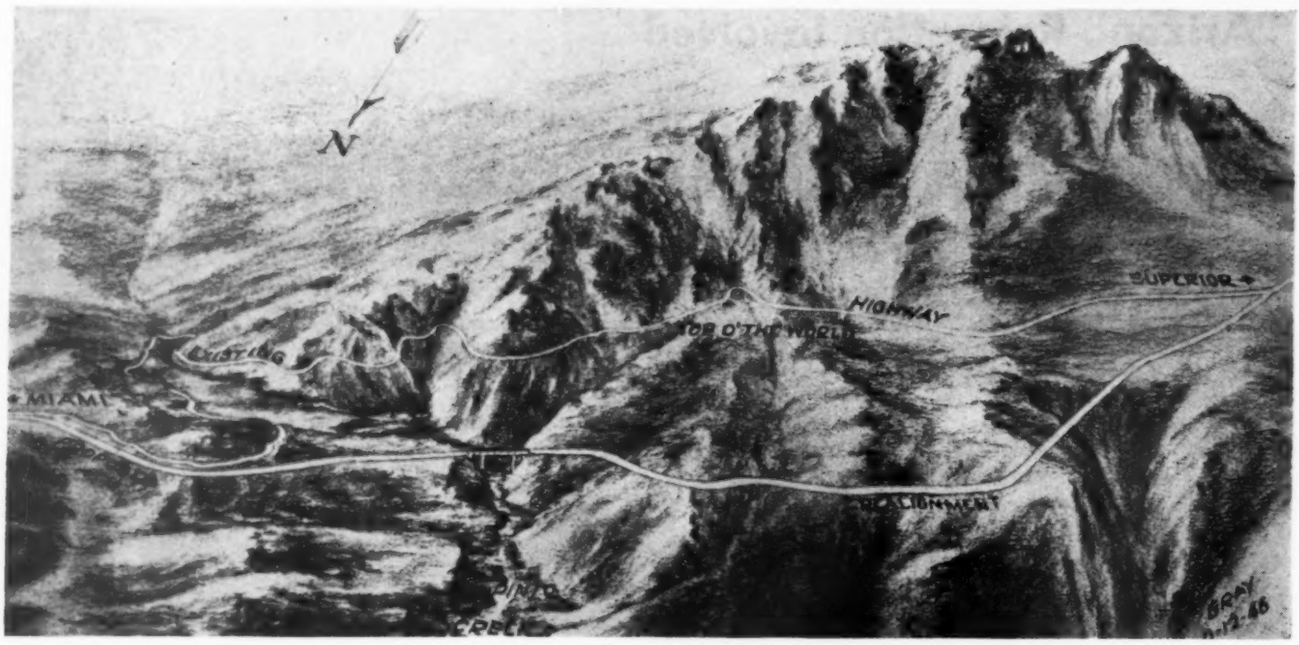
Building pilot roads to move in equipment was no minor problem. This feature was carried out in advance of the clearing and grubbing which was kept ahead of the drilling operations.

All deep cuts were drilled with a 29-T Bucyrus-Erie well rig. Shallow cuts up to 20 ft. were drilled with jackhammers, with one Gardner- Denver, one Le Roi and three Ingersoll Rand compressors supplying the air.

Two 43-B Bucyrus-Erie shovels, four Caterpillar tractors with dozers, and two LeTourneau carryalls were used in the excavation. Most cuts were drilled to their full depth and blasted

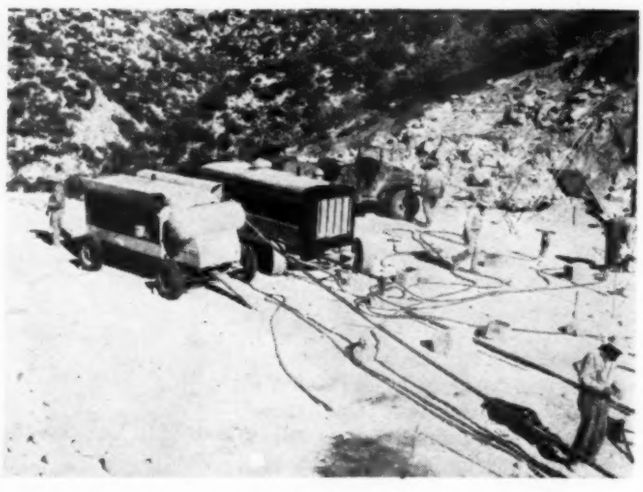
★ Spreading stone base. Rail and posts strewn along for guard fence

★ Toe of this canyon-side fill slopes down nearly 200 ft. Some spreading or re-leveling with dozers was necessary to secure proper bedding down in layers

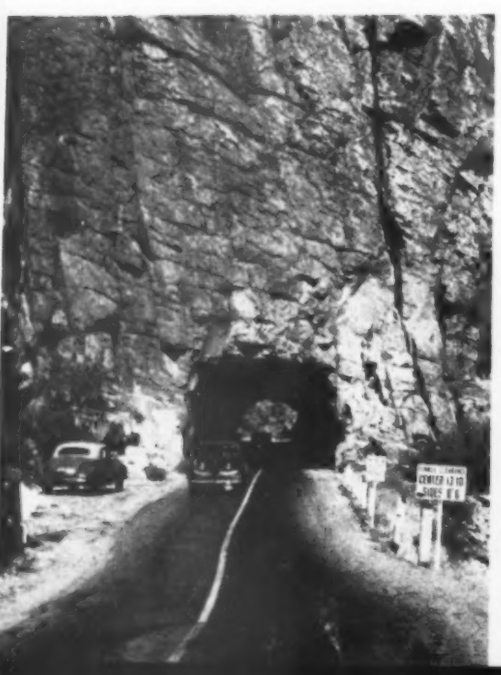


★ Proposed Superior-Miami road relocation which will replace hazardous grapevine with modern 60-mph roadway

★ Apache Indians working here made a fine team. Some of these men have worked with Orr & Orr on road work since 1931. Timken bits used, 1 to 3 ft. hole depth



★ Two large compressors supplied the drills for a smaller cut adjoining the canyon bridge site (Le Roi 350 and Gardner-Denver 500). Five compressors were employed in the project



★ One of the tunnels spectacular Superior-Miami road which will be eliminated

★ Site of Pinto Canyon steel arch bridge

with Apache bag or 40% stick powder, then worked to a full face. One cut of nearly 100,000 cu. yd. had to be worked in lifts, as it reached 156 ft. depth on the upper slope. This cut was sloped ½ to 1 rather than ¼ to 1, due to presence of talus. The material was hauled with four 12-yd. White trucks and six 8-yd. Hug trucks.

Bulldozers were used in the spreading and bedding down operations in the fills. Due to the precipitous nature of the terrain, the embankment material usually had to be end dumped and then rehandled by spreader tractors in bedding down in layers. One fill presented an unusual problem, as one end abutted a vertical cliff of over one hundred feet in depth on centerline and the 1½:1 slope ranged up to 226 ft. in height from the lowest slope stake.

Hard Granite Encountered

The classification of the rock in general was hard, native granite. However, one cut on the west approach of the Pinto Creek bridge was an alluvial deposit, but required drilling and blasting before the material could be handled by the rock shovels.

The rough terrain was a handicap for the engineering party. It was often necessary to pack in at various points on the line. All cross-sections and slope stakes were taken with extreme care with a Y-level, because of the yardage involved. Triangulation and slope chaining were often necessary. All construction problems were worked out by the engineering and construction forces giving each other their full cooperation and understanding of the practical details which would be involved.

High Roadway Standards

The 40-ft. roadway is widened at curves, which by the way are fully spiraled. The cross-section consists of 8 in. of 1½-in.-minus crusher-run stone, a bituminous road mix surface and emulsified asphalt seal with blotter chips. The subgrade was constructed to 48-ft. width plus curve widening, and is a safety measure the pavement roadway is to be striped as a 2-lane around curves.

C. B. Browning served as resident engineer of this project. W. C. Lefebure is state highway engineer.

Ohio Highway Conference

Encouraged by the large attendance of nearly 500 last year, the Ohio State University and Ohio State Department of Highways will hold a highway engineering conference at Columbus. The date is March 23-25, University campus.

The road show to be held in conjunction is sponsored by the Ohio Equipment Distributors Association. This year also several groups have volunteered their cooperation in helping with conference arrangements. These include: Ohio Good Roads Assn.; Ohio Contractors Assn.; County Engineers of Ohio; Portland Cement Assn.; Bituminous Concrete Producers Assn.; Macadam Pavements, Inc.; Ohio Sand and Gravel Assn.; Ohio Ready-Mix Concrete Assn.; Asphalt Institute; and Ohio Equipment Distributors Assn.

★ One of the lesser cuts—Bucyrus-Erie 2-yd. loading to White 12-yd. 6x6 truck. Day of Editor's visit, the 8 and 12-yd. trucks dumped 161 loads on under-1000-ft. hauls, approaching the general average of 700 cu. yd. rock per day per 2-yd. shovel chalked up for this difficult project

Rail Cars Diverted from Construction

A total of 3,490 highside gondola and hopper cars generally used in hauling gravel, sand and other road-building materials by rail were released in December for the transportation of coal, according to Washington reports. Diversion of cars of this type to coal hauling during winter months was made at request of John R. Steelman, an Assistant to the President, who asked the PRA highway officials and contractors to assist in the car situation.

In a report forwarded to Mr. Steelman today, Major General Philip B. Fleming, Federal Works Administrator, stated that a substantial reduction of cars normally used in Southern States to transport highway construction materials has been effected by using local materials that can be hauled by truck and by deferring less urgent road work requiring aggregates that must be hauled by rail. He noted that the number of cars required for the transportation of highway materials in Northern States during the winter months is negligible, as nearly all road construction and maintenance is then suspended.

Traffic Fatalities Estimated 32,500 in 1947

The year 1947 ended with a traffic death toll estimated by the National Safety Council at 32,500. This is 1,200 less than the 33,700 killed in motor vehicle accidents in 1946 and 7,469 less than the 39,969 killed in 1941. Figures are from Pyke Johnson, President, Automotive Safety Foundation, Washington, D. C.

While travel figures are not yet available for the entire year, it has been estimated that mileage in 1947 ran about 10% above 1946 and about 12% above 1941. This would mean a 1947 fatality rate (deaths per 100 million vehicle miles) of between 8.5 and 9, the lowest in U. S. history.

Danner of AED Foresees Big Machinery Year

Survey of business conditions in the construction equipment industry announced at Chicago conference

FORTIFIED by the undiminished need for both public and private construction of all types, conditions in the construction equipment industry are better than at any time since before the war, according to a nationwide survey made by the Associated Equipment Distributors, whose members include manufacturers and distributors of construction equipment.

In announcing the results of the survey in Chicago January 22, W. A. Danner of Boston, President of the AED, declared that the survey reveals a general optimism over prospects in 1948 due, chiefly, to the high level of construction activity and the increasing success of manufacturers in stepping up production to meet deferred demand built up during the war years.

However, Danner explained that, "While the feeling throughout the industry is largely one of optimism, it is a cautious optimism—an optimism tempered by uncertainty. If there is any large scale diversion of basic raw materials or finished equipment for export under the European recovery program, it would undoubtedly aggravate our present difficulties and restore some of those from which we have but recently been "relieved."

More Group Cooperation

A hoped for development in the near future, Danner says, is the return of competition among management and competition among labor—not against each other, but within their respective groups. This will probably do more than any other thing to promote business stability and increase productivity and efficiency right along the line from manufacturer to distributor to contractor, he said.

According to the survey, construction contracts in all classifications, public and private, are being awarded in large volume. In a few scattered areas some bids have been rejected as too high, but in most cases these have been readvertised and let at the higher figure. In the Pacific Northwest, state and municipal awards are lagging because of short appropriations, but improvement is expected in the second quarter of 1948.

Contractors are generally busy, though severe winter weather has forced the usual seasonal decline in some states.

Machine Sales High

With the possible exception of several western states, distributors foresee no drop in equipment sales in the immediate future. A decline of about 15 per cent since last July has been noted in the California-Nevada-Arizona area. In Wyoming, Colorado, New Mexico and Utah sales are tend-

(*Continued on page* 90)

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HOW TO DIG A DITCH — AND NOT GO IN THE HOLE

Yager and Sons, Beaverton, Michigan, call the 3-cylinder GM Series 71 Diesel that powers this shovel "just about the best power we've ever used." Inset shows Mr. Fay Yager, in charge of the shovel operation, who says, "You fellows just don't boast enough about that GM Diesel engine."

Shown here is a General Motors Diesel-powered Bay City ¾ yard shovel. It's doing the toughest part of a pipe-trench job—mile after mile of 6′ by 12′ trench—cutting through wet sand, swamp mud, pulling stumps, digging in the roughest kind of terrain.

Taking jobs like this in stride is everyday work for GM Diesel-powered equipment. The 2-cycle GM Diesel gives instant response to widely fluctuating power demands, operates on low-cost fuel, and delivers long, economical service.

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★ Inspecting soil-cement mixture before compaction is completed

600-mile Farm-Market Program

Launched by this Tennessee County

First soil-cement projects completed late in 1947, using stabilizer rented from contractor

By R. E. L. Odom
County Engineer, Madison County, Jackson, Tenn.

A TEN-YEAR program that will add some 600 miles to our surfaced secondary and local road mileage, is the Madison County Court's plan to give citizens in all communities better transportation and at the same time reduce road surface maintenance costs.

This long-range program grew partly out of the fact that during the past nine years, maintenance of roads as then improved (or uninmproved) cost the county around $100,000 an-

★ Scarifying old roadbed to a depth of 5½ in. compacted, preparatory to spreading portland cement. After this operation the roadway is shaped to approximate crown and grade before cement is spread

★ String-line to control width of cement spread is then set from offset line stakes

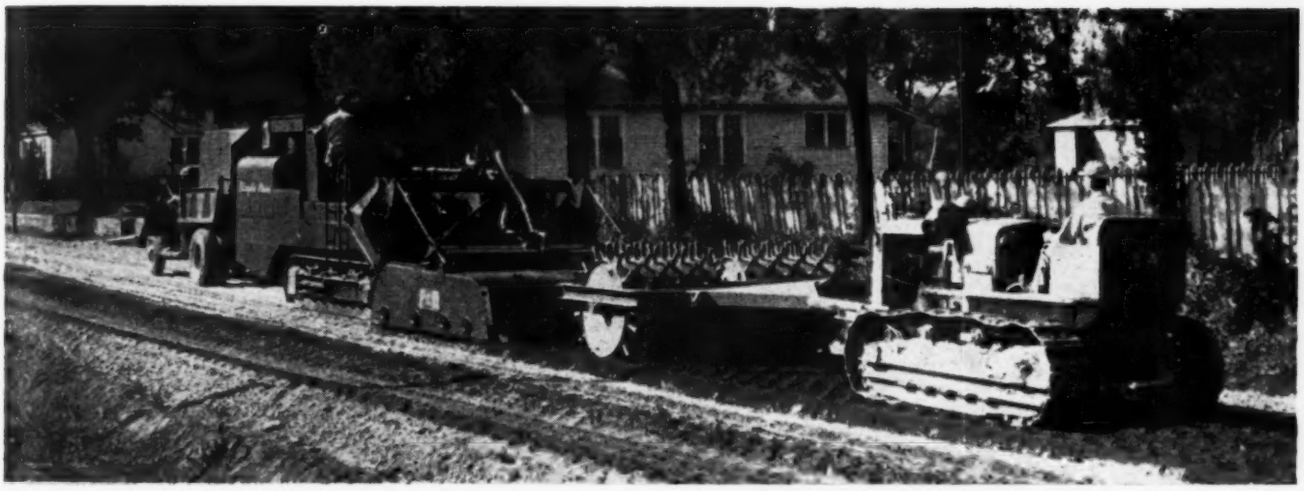
nually, directly or indirectly. This continuing expense has constituted a challenge, for it is believed that well planned low-cost roads, built a few miles per year, could lead to a gradual reduction of maintenance while up-grading our road system generally. Many miles of Madison County's present farm-to-market roads are of earth or granular base materials which require constant upkeep, are dangerously rutted and potholed in the spring, must be closed frequently for repairs, and add to the cost of owning and operating autos and trucks.

The County was barely able to keep roads in passable condition during the 1937-1946 decade, there being very little funds left over for few improvements during the period. The annual maintenance expenditure ranging from $78,000 to $119,000 went for such items as bridge lumber, culverts, hardware, tools, gravel, gasoline, oil, machinery repairs and replacements, lights, insurance, supplies for county prison labor and wages of hired labor. All are, of course, familiar and legitimate items; the big concern is that upkeep ate up virtually the whole road budget.

We spent quite a period of time and study considering ways and means, and as a result, a $2,500,000 bond issue was approved for county

★ (Left): Cement plant used to transfer bulk cement from hopper car to dump truck. (Right): Haliburton mechanical cement spreader used on project attaches to rear of dump truck. Required amount of cement is spread by means of a metering device on the spreader

★ R. E. L. Odom, County Engineer, Madison County, Tenn.



★ The P & H Single-Pass Stabilizer, which mixes a 9'3" width section each pass, cuts the full 18-ft. width roadway to a depth of 6 compacted inches in two trips of the machine. Truck being pushed by the stabilizer furnishes water, which is added by spray bars into the mixing box to obtain optimum moisture content in the mixture. Sheepsfoot roller, pushed by tractor immediately behind the stabilizer, compacts the soil-cement mixture to the required maximum density

★ Motor patrol grader and spike-tooth harrow leveling and shaping roadway. Spike-tooth harrow lightly scratches surface to remove compaction planes during final finishing operations. (At right): Spike-tooth harrow in operation

★ 850-gal. gravity fed tank, equipped with 9-ft. spray-bar, adding water before final shaping and rolling

★ Multiple-wheel pneumatic-tired roller obtaining final surface compaction which results in a dense, tightly knit surface

★ Motor patrol grader establishing final crown and grade

★ A completed section of soil-cement base on Madison County's Ridge-crest Cemetery Road

road construction and maintenance. It has been decided to use some of these funds each year to place soil-cement on as many of these old roads as we can.

While soil-cement is adaptable to a wide range of roadbed materials, the soils and granular materials in our present roads are particularly well adapted for this type of construction. Excellent soil-cement bases have already been completed in Madison County using soils ranging from sandy clay loams that require 8% cement by volume, to A-7 silty clays that require 12% cement by volume. From my previous experience with soil-cement it is expected that our roads will cost little to maintain.

The first roads to be thus improved were completed late in 1947. These include ten projects, ranging in length from 0.6 to 3.0 miles, totaling 15 miles, (151,000 sq. yd.). For this work we were able to obtain a P & H stabilizer on a rental basis from a contractor (Delta Paving Company of Jackson, Miss.) Since that time, Madison County has purchased a P & H machine with which we plan to continue the program in 1948.

As to the soil-cement procedure, standard methods of processing and field control are being followed to insure satisfactory results. Soil-cement is being processed by the traveling stabilizer to a depth of six compacted inches, the operation requiring two trips of the machine to mix an 18-ft. width roadway. An emulsified asphalt coat of 0.17 gal. per sq. yd. is being applied to prevent moisture loss during curing and also serves as a prime for a subsequent 70 lb. double bituminous surface treatment. Some of the details are shown in the accompanying snap-shots and photo-captions.

Six hundred miles of road improvements is a lot of miles, but by using largely the materials already in the road and spreading the work over a decade, we will only be doing an upgrading job any county road organization could do if really determined.

★ Immediately after soil-cement base is completed, emulsified asphalt is applied. Asphalt serves double purpose as it prevents moisture loss from the soil-cement and later is used for a prime coat before appliaction of 70 lb. per sq. yd. asphalt double surface treatment

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How 200-inch Telescope Mirror Was

Hauled 160 Miles

42-tire low-bed trailer used under special overload permit, requiring study of alternate routes and check on timber bridge stresses

By Richard A. Wagner
Associate Bridge Engineer,
California Division of Highways, Sacramento

ON NOVEMBER 18 and 19, 1947, the 200-in. mirror for the telescope in the observatory on Palomar Mountain in San Diego County, California, was moved from the Optical Laboratory at the California Institute of Technology at Pasadena to the observatory.

The total weight of the mirror, together with its supporting frame and packing box, was about 75,200 lb. The load was hauled under an overload permit issued by District VII office of the Division of Highways at Los Angeles. The mirror was hauled on a 7-axle low-bed trailer combination (Freuhauf) having eight pneumatic tires each on axle Nos. 4, 5, 6 and 7. Axle Nos. 2 and 3 were standard duals having four tires on each axle. Axle No. 1 was the steering axle having two wheels.

The total computed gross load imposed upon the highway and bridges by axle Nos. 6 and 7 was 62,480 lb. under the load of the mirror and appurtenances. The load on this set of dual axles was governing insofar as the bridges were concerned.

Several Routes Considered

In selecting a route of travel on the state highways for this overload, it was not possible to find one which did not contain a timber bridge. The route finally adopted, after due consideration was given to strength of bridges, traffic conditions and smoothness of traveled way, required that the load cross the Galivan Overhead Structure on State Highway Route 2, in Orange County (U.S. Route 101). This is a reinforced concrete structure over the AT & SF railroad tracks, with seven redwood timber stringer spans at the north end. These stringer spans are each 19 ft. long between centers of supporting caps. The caps are supported on timber piles. As far as the state highway bridges were concerned, the Galivan Overhead Structure governed.

This overload was of greater weight than normally permitted over this bridge under an overload permit. However, due to the importance of the move, special consideration was given to the matter and the Bridge Department computed the stress in the stringers of the timber spans of the Galivan Overhead. It was found that the mirror and transporting equipment could cross the bridge with safety to the structure and to the cargo, providing that no other traffic was on the bridge at the time of crossing, and providing further that the load did not move across the bridge at a speed in excess of 5 mph.

Supplementary Dollies

The California Institute of Technology was advised that the State would issue a permit for this overload to cross the Galivan Overhead Structure under the above conditions. However, due to the high value of the cargo, which was in the neighborhood of $1,000,000, the engineers and scientists of the California Institute of Technology, in order to remove all risk for the safety of the mirror, requested that the hauling contractor place two additional 8-tired dollies, one on each side of the mirror box, supporting the ends of one of the transverse steel "I" beams upon which the mirror and appurtenances rested. These supplementary dollies were placed under the load before it proceeded across the bridge. The portion of the total load to be carried on the dollies was adjusted with a screw jack arrangement until the tire deflection on the dollies was approximately the same as the tire deflections on axle Nos. 6 and 7 of the rear duals of the trailer. These supplementary dollies greatly improved conditions of transverse distribution of the total load to the stringers.

Timber Deflection Checked

Before the load crossed the structure, "Tell Tale" deflection gauges were placed under the second timber span from the north end of the bridge. One of these gauges was placed on the second stringer from the west, and the other on the eleventh stringer from the west. The eleventh stringer from the west is adjacent to the center line of the roadway. The gauges were placed at the center of the stringer spans. The maximum deflection, due to live load and impact, was measured when the mirror and transporting equipment crossed the bridge. The measured deflection, due to live load and impact,

★ The 160-ton load being inched along deck of bridge, while timber stringer spans were checked for deflection as an extra safeguard. Note use of 16 tired "Jeep" trailer. Across this structure dollies were attached to help spread loads of No. 6 and 7 axles over 16 instead of 8 tires each

Photo by Acme

★ Showing the special dual-tired dollies added on either side of both wheels of the two rear axles, installed temporarily for crossing the weakest bridge

was ¼-in. at stringer No. 11 and about 5/32-in. at stringer No. 2. The computed stress for dead load and live load and impact for the vehicle combination with the outriggers in place, was considerably less than that computed for the loaded equipment without the outrigger dollies, which indicated that these dollies were effective in increasing the transverse distribution of the load to the timber stringers and thereby decreasing stringer stresses.

The load safely crossed the bridge without damage either to the bridge or to the mirror.

Realism Needed in Road Building, Trailer Group Told

User point of view presented here as of special interest to highway officials in that it indicates needs to better sell organized motorists and truckers on purposes and practicability of long-range planning—Editor.

Long-range state highway planning is the highway user's attempt to "put realism instead of dreaming" into future highway development, members of the Truck-Trailer Manufacturers Association were told at their annual meeting, held January 13, at Edgewater Park, Miss.

Such planning, in the words of a bulletin from the National Highway Users Conference, is "the highway user's answer to the highway 'promoters,' who want all the emphasis put on building of highways and little or none on how they can be reasonably financed," P. D. McLean, assistant director of the National Highway Users Conference, told the manufacturing group.

No Talent Needed for Spending

"It is important to note that there is hardly a conceivable limit to the billions of dollars that we could expend on America's highway system if we willed it," McLean said. "Our problem is to find out which roads most need improvement and how we can pay for the job without taxing some drivers off the roads.

"It takes no great talent to be a big spender; it takes a lot of talent, and planning, to see that we get better roads where they are most needed and within our ability to pay."

Rural Road Problem Cited

McLean said that many state highway users' conferences which are affiliated with his national group are actively supporting plans whereby each state legislature shall create official planning committees to examine state highway needs, the order in which those needs shall be met, and how the cost can be financed without undue burden on the highway user. Such state committees should include highway user representation, McLean said.

"A vital ingredient of this long-range planning is a curb, where still needed, on the practice of diverting highway funds to non-highway purposes," McLean said. "In some states the money that has been diverted to general governmental spending might have made the difference between an adequate and an inadequate highway system.

"If the highway system of a particular state is inadequate because of diversion of highway user taxes, then that state has an obligation to restore diverted money before it thinks of new taxes. Why should highway users, who have paid enough in taxes to get good roads, be asked to pick up the same check twice?"

McLean said there is no greater opportunity for gaining highway progress than in this field of long-range highway planning. What you do in the coming legislative sessions will have vital bearings on your highway futures. With sound planning, we can afford free roads, not toll roads. With this planning, we can help see that the rural citizens, particularly, get the better roads they are anxiously seeking today.

"ARISE, MY BOY, AND GREET THE CHEERY DAY — EVERYTHING LIES BENEATH A BEAUTIFUL BLANKET OF SNOW — INCLUDING ALL OUR EQUIPMENT — "

Pre-Qualification Methods

Current Procedure Used in Pre-Qualifying Contractors by the State Highway Department of Connecticut

By E. T. Nettleton
Engineer of Contracts, State Highway Department of Connecticut, Hartford

THE State Highway Department of Connecticut requires the annual filing of a contractor's statement on a prescribed form furnished by the Department. This 8-page form, when properly filled in, lists first such general information as the contractor's status as a corporation, partnership or individual, and the principals of the organization, along with references. Then comes the financial statement, followed by supporting details relative to assets and liabilities. One page is devoted to a list of major equipment, listing such details as the capacity, condition, age, purchase price and present book value of each piece. Following this, a page is devoted to lists of projects completed and information pertaining to any incompleted or defaulted contracts. The last page gives the employment record of the principal individuals of the company. The whole statement is then signed and sworn to. There is a definite rule prohibiting the issuance of a bid proposal to any contractor who has not properly filed or fully answered this questionnaire.

Statements Verified

Statements made on the form are frequently checked by various methods. Supplementary information concerning the contractor is also obtained or requested by the Department, from time to time, when it appears evident that important changes may have occurred in a contractor's finances, equipment, or personnel. On occasions, a contractor may either be requested, or he may elect, to file a new statement. Added to the above information, the Department keeps a record of the amount of work a contractor has formerly done for the State with their quality of workmanship, their spirit of cooperation, their experience as to completion of jobs ahead of time, on time, or over the time allotted.

From the above facts, a contractor is rated, first, as to the financial cost or size of a job it would appear he could undertake and, second as to the type of job he has experience and equipment to handle. This rating is revised, from time to time; especially, if the contractor has a large amount of work on hand and his financial and equipment capacity for additional work appears limited.

The Department is now making it a practice, as each advertising list of jobs for a letting is made up, to rate each job as to the finances and equipment necessary to swing the job and as to the type of job.

When a contractor's rating meets the requirements for the job, which is usually in nine out of ten cases, both as to finances and the type of job, the bid proposals are granted for that job to the contractor, upon his request, without any questioning. As it happens, the contractor is rarely aware of the fact that he has been prequalified. On the other hand, when it appears according to the information in the Department's records, that the contractor's rating does not meet or, in other words, qualify him for the particular job in question, the Department informs him of the fact.

Talk It Over

In this case, the contractor usually withdraws his request for that particular job and selects a smaller job or one of a different type on which he is qualified to bid. However, should the contractor still wish to bid on the former job, he is then invited to informally discuss his qualifications with a representative of the Department. This he may do in person, through his bonding company's representative, or, better yet, by both individuals appearing together.

In this informal discussion or conference, oftentimes the contractor or bonding company's representative shows to the satisfaction of the Department that the contractor is qualified for the job in question. In some cases the reverse is true, and the Department points out the legitimate reasons for withholding the issuance of a proposal bid for the work. In the latter case, since the bonding company is not willing to go bond for the contractor, the question is dropped.

Experience to date, in using this method, has appeared most gratifying. The qualified contractor likes the idea, as he soon learns he is bidding only against those who are qualified. The non-qualified contractor, after he is diplomatically told and explained the reason he does not qualify for that particular job, rarely objects. In most every case, he realizes that he is not being discriminated against and that, in fact, the Department is actually protecting him until he is sure of his ground. He also realizes that on the next job he may be qualified and not forced to bid against those who are unqualified for that job.

The bonding companies are most enthusiastic and cooperative, as they are in sympathy with the plan, since the Department's judgment comes from a little different angle and acts as a check upon their opinions. Furthermore, it prevents the irresponsible bidder from running from one agent to another until he finally gets a bid bond. The Department likes the method, as the question of responsibility is not raised after bids have been received. Consequently, awards can be made to the low bidder without embarrassment, providing, of course, that the bid is reasonable and free from unbalanced items or other irregularities.

Uses of Traffic Accident Reports

A manual on the use of traffic accident reports for the prevention of further highway mishaps has been completed after seven years of preparation. The manual was compiled by the Committee on Uses of Developed Information of the National Conference on Traffic Accident Statistics. The project was headed by Wilbur S. Smith, Associate Director of the Yale Bureau of Highway Traffic. The manual will be distributed free of charge under the Eno Foundation for Highway Traffic Control, Inc., Yale University, New Haven, Conn.

•

$465,000,000 for Flood Control—President Truman in his message to Congress on Jan. 12 recommended an appropriation of $70,000,000 for lower Mississippi River flood control, $395,940,000 for general flood control and $191,267,000 for river and harbor improvements.

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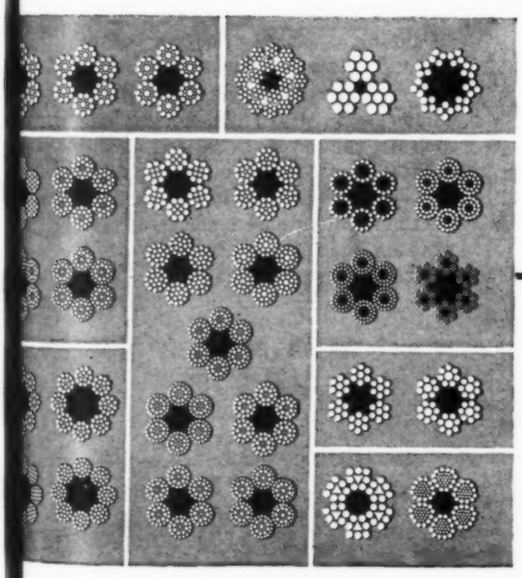

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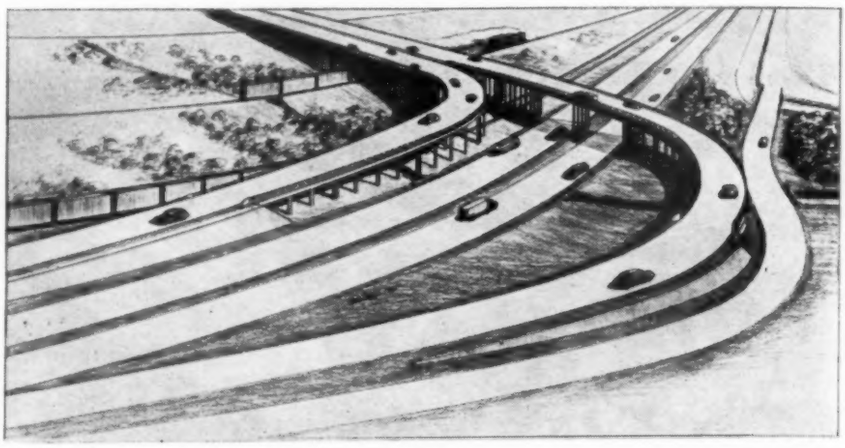
Unusual Skewed Bridges Under Way at El Paso

AMONG the bridge projects in the current Texas highway program are two overpasses at El Paso—the A.T.&S.F. yard overpass and the Main Street viaduct pictured herewith. The outstanding feature of each structure is the unusual method of solving pier column positions. The difficulties encountered in making the overcrossings were such that the conventional type structure could not be used.

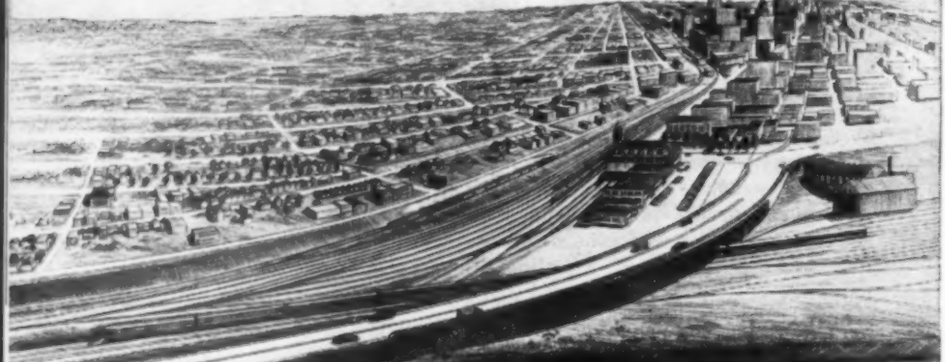
In general the construction is as follows: The superstructure is designed as a steel mat consisting of heavy stringers running along the outside of the structure with floor beams framing into these stringers at regular intervals. The concrete deck is supported on lighter stringers framing into the floor beams. The superstructure mat is supported by steel piles welded directly to the floor beam and outside stringers. A pile is placed at all points where the bent line intersects a floor beam or an outside stringer.

The floor beams are of cross-section sufficiently heavy to resist bending moments resulting from the various possible locations of piles. All floor beams are of the same section in order to preserve the rigidity of the superstructure and to simplify fabrication. This scheme has several advantages, one of which is that longer spans can be permitted for given beam depth and another is the reduction of unequal deflections on adjacent beams. This unequal deflection is particularly serious in a structure of such an extreme skew and could quite conceivably cause cracking of the concrete slab.



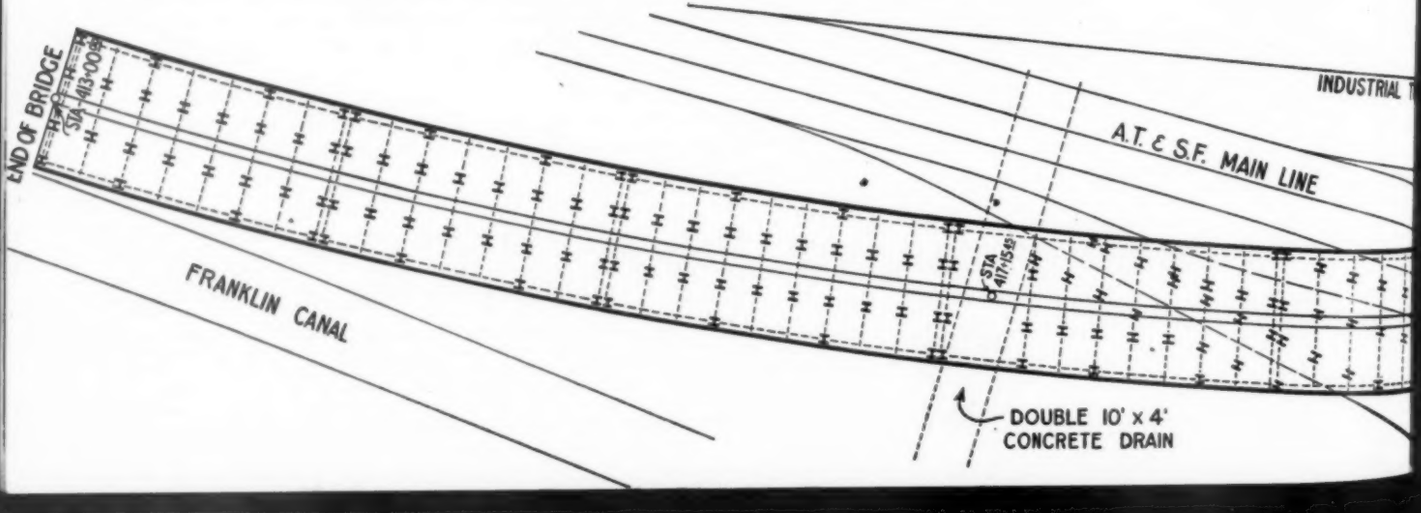
★ Main Street viaduct, also planned for El Paso

The method of stress computation is simple. All floor beams are cut loose at one end such that the resulting structure is composed of two continuous stringers. The deflection under load is computed at all of the cut points. Unit loads are then applied to the cut points and the resulting deflections computed. A series of simultaneous equations is thus set up, the solution of which gives the shear at



★ Artist's sketch of the Santa Fe overpass

★ The 1259-ft. Santa Fe overpass planned for El Paso. Pile post framing scheme with respect to floor beams and outside stringers, as shown here, also used in the Main Street structure pictured here



all of the cut points and from this point on the structure is solved in the same manner as any continuous beam.

The deck provides for 4 lanes of traffic with 4-ft. median strip, and a 3½-ft. walk.

The A.T.&S.F. underpass is 1,258 ft. 8 in. in length. Its design is made even more interesting to the men in the drafting room by virtue of including both a vertical and a compound horizontal roadway curve in addition to the skew.

The Main Street viaduct is also of interest for its split approach, the two separate roadways ramping down at 14 and 18 deg. curvative, respectively, to enter an express roadway.

James P. Exum, bridge engineer, and staff designed these Texas highway department projects as part of the urban arterial development through El Paso.

Roadside Control in New Jersey

The new constitution of New Jersey adopted at the election on Nov. 4, 1947, contains the following broadly conceived and somewhat unusual provision for land acquisition and roadside protection.

Article IV, Sec. 6, Subsection 3.

"Any agency or political subdivision of the State, or any agency of a political subdivision thereof, which may be empowered to take or otherwise acquire private property for any public highway, parkway, airport, place, improvement, or use, may be authorized by law to take or otherwise acquire a fee simple absolute or any lesser interest, and may be authorized by law to take or otherwise acquire a fee simple absolute in, easements upon, or the benefit of restrictions upon, abutting property to preserve and protect the public highway, parkway, airport, place, improvement, or use; but such taking shall be with just compensation."

The Highway Research Correlation Service in its Circular No. 29 comments on this provision as follows:

"This section, if implemented by legislation to spell out some of the administrative details more adequately, should provide adequate means for preserving and protecting public highways in that State. The constitutional provision is broadly conceived to apply to designated public improvements in addition to highways. The authority granted must be exercised under the power of eminent domain rather than under the police power."

New Type Traffic Service Offered by Consultant Firm

Municipal studies show that America has a number of medium-sized cities with traffic and planning problems, but without the trained personnel to solve them. To meet this need, what is believed to be an innovation in traffic advisory service is now being offered by two men who have been active in American Road Builders' Association technical groups.

The principals of the new firm of consultants are Leslie Williams, of New York, chairman of the ARBA committee on Highway Terminals, and Charles M. Upham, Jr., of Hartford, Conn., secretary of the same committee.

"Cities not large enough to maintain a staff of traffic engineers can use a service such as we propose," said Mr. Williams, who is engineer of the American Transit Association. "We expect to give a sustained advisory service to both communities, companies and institutions on traffic and city planning problems, accidents and congestion, parking, mass transportation, highway terminals, airports, parks, subdivisions, housing, zoning and public utilities."

Mr. Williams went on to explain that his company would analyze the city's problems and advise the extent of service that would be required. "Our service can then be tailored to the prospect's exact requirements," he added.

Williams and Upham contemplate establishing offices throughout the United States, with headquarters in New York City at 292 Madison Avenue. A branch office has been set up in Hartford, Conn., to serve the New England area.

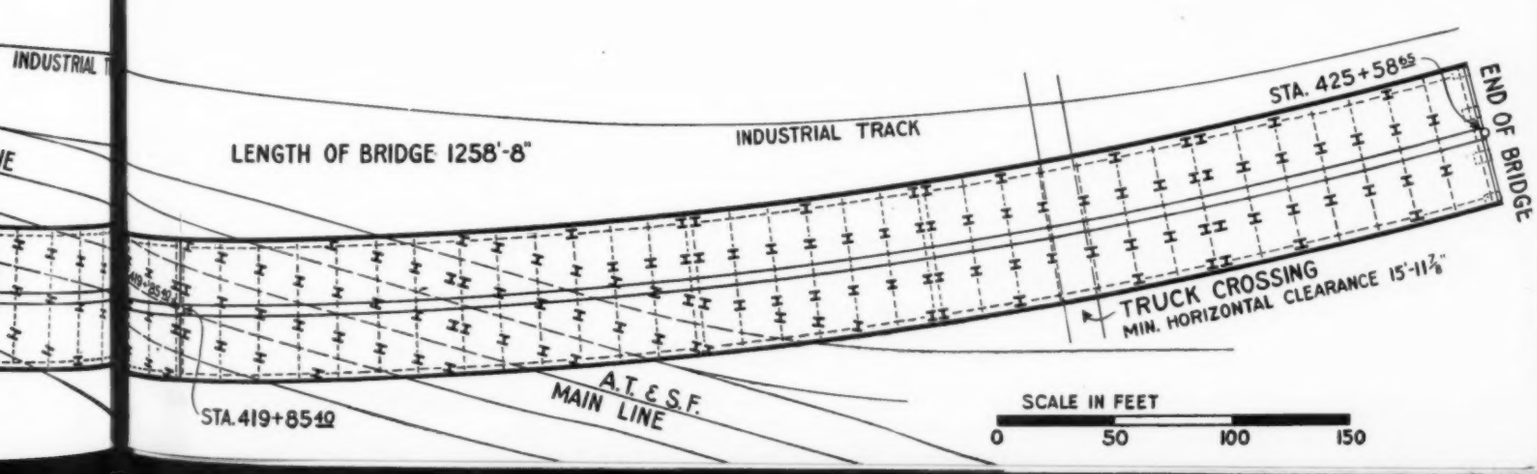
Hoak Re-elected

H. L. Hoak, Des Moines, newly elected president of the Associated General Contractors of Iowa, is serving his third year on the board of directors. He held the position of vice president last year.

Mr. Hoak is well known in the construction field in Iowa. He is president of the Hoak Construction Company, a well established contracting firm which has engaged in the construction of sewer and water-works improvements and during the past few years has operated principally in the rural electrification field. In the past three years his company has constructed over 2,500 miles of electric line in Iowa.

●

Final cost estimates on the proposed Oklahoma City-Tulsa toll road, now being awaited, may determine feasibility of the project. A preliminary report by this firm to the Turnpike Authority indicated the toll to be charged might have to be higher than 1 cent a mile which is the passenger-car charge on both the Pennsylvania and Maine toll roads.



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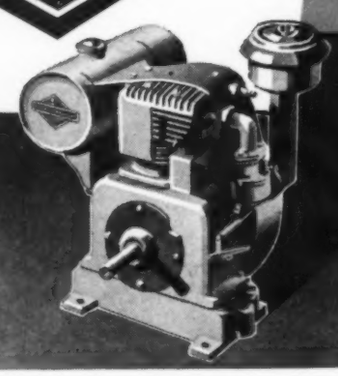

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BRIGGS & STRATTON CORPORATION, MILWAUKEE 1, WIS., U. S. A.

(*Continued from page* 78)

ing to level off and revert to a normal, seasonal basis. Nevertheless, even in these states, distributors look for a good year.

Deliveries of all construction equipment, including heavy items, have eased, although the products of some individual manufacturers are still in short supply. During the past year the situation has changed from one of general scarcity to a fairly good balance between supply and demand.

Most distributors report inventories are large in dollar volume, but they are not considered too heavy when measured in machine units. There is still considerable unbalance on specific items.

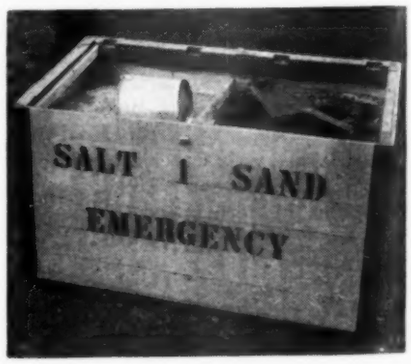
In about one-third of the states, trade-ins have increased 25 to 100% in recent months, and buyers are said to be demanding excessive trade-in allowances. As deliveries continue to improve, distributors elsewhere expect to face the same problem within a short time.

A decided slowdown in collections has been noted by most distributors and they, in turn, are following a more cautious credit policy. They report a steady tightening of bank credit during the past few months.

In Canada, present import limitations have resulted in abnormally low inventories. However, Canadian distributors look for continued heavy construction activity in 1948.

Anti-Skid Boxes for Drivers

To reduce automobile skidding accidents during and after snow and ice storms, the city of Scranton, Pa., built 25 boxes like the one shown here, filled them with rock salt and sand,



Scranton's Anti-Skid Box

and installed them at dangerous hills and intersections throughout the city. In addition to the rock salt and sand, each box contains a pail and a shovel so that motorists and pedestrians can easily spread the materials on danger spots before the city snow and ice removal equipment arrives.

REPLACE WORN CLUTCHES NOW!

Get New Clutch Service at 2/3 the Cost

AVAILABLE NOW FROM YOUR INTERNATIONAL DEALER OR BRANCH

INTERNATIONAL Factory-Rebuilt EXCHANGE CLUTCHES

Same International Warranty as for New Clutches

HERE'S your chance to immediately replace worn, slipping clutches—quickly, easily—and save one-third the cost of new clutches.

Right now your International Dealer or Branch has International *Factory-Rebuilt* Clutches for all models of International Trucks.

These clutches are ready for immediate installation. You lose no time waiting for old clutches to be overhauled.

You get International Clutches that give the same service as new clutches—that carry the same International warranty.

And the cost to you is two-thirds or less.

Act now! Avoid lay-ups and delays! Get better truck performance! Have your International Dealer or Branch install International Factory-Rebuilt Clutches now.

Other International Exchange Units

Your International Dealer or Branch has many other International Truck Exchange Units. Same quick installation as clutches. Same new unit service at a substantial saving. Get details, sure.

Motor Truck Division
INTERNATIONAL HARVESTER COMPANY
180 North Michigan Avenue Chicago 1, Illinois

Tune in James Melton on "Harvest of Stars!" NBC Sundays.

THIS EMBLEM IDENTIFIES GREAT TRUCKS
INTERNATIONAL

INTERNATIONAL *Trucks*

★ Willow mats being placed to protect newly completed bridge in Richland County, Ohio. Geo. B. Herring, of Mansfield, Ohio, contractor.

Willow Mats

Economical for Bank Protection

By Dallas D. Dupre, Jr.
Landscape Architect,
Ohio Department of Highways, Columbus

A CAREFULLY devised system of stream bank protection employing live willow and other live tree branches, tied down with fence wire, has been employed successfully in Ohio. We have found this operation to be very practical, efficient, and inexpensive, when compared with stone rip-rap, which it quite generally has replaced in our practice excepting at critical points.

The method in general consists of smoothing or properly cross-sectioning the slopes to be protected, setting branches in vertical position working up from toe trenches (see photos), and laying over and securely tying farm field fence.

The present price per lineal foot is averaging about $2.50 for 6 to 8 ft. lengths of willow and $3.00 for 12 to 14 ft. lengths.

Specification Details

Specifications for mat construction, which describe all necessary field details, are as follows:

Preparatory to placing willow branches, banks to be protected shall be made reasonably smooth, removing projections which would prevent branches lying flat on slope for distance of over 2 ft. A trench 2 ft. deep measured vertically shall be dug at toe of slope, saving excavated earth for back-filling immediately after placing branches. Back of ditch shall

★ An excellent view of mat construction details

★ This stream has heavy freshets in the spring and fall, but the willow mat has held perfectly. The protection starts as soon as the mat is placed, and doesn't wait until the branches take root and start sprouting. State Rte. 644, Hocking County, Ohio

★ Showing freshly placed mat—autumn, 1945, before root or branch growth has begun. State Rte. 69, Wayne County. (Right): Same scene—Nov., 1946, showing erosion protecting growth well begun

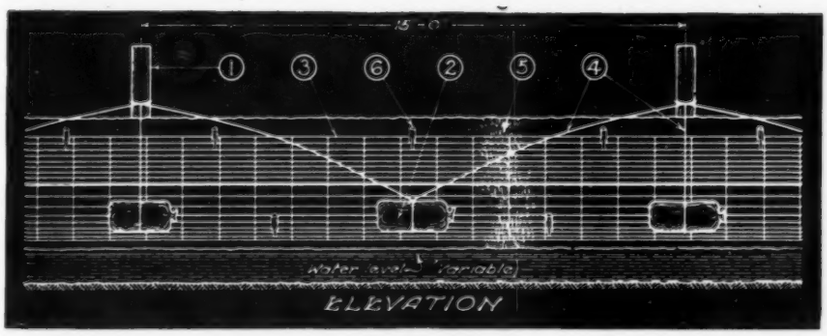
be same plane as the slope. Where soil conditions will permit without damage to branch bark, and if so directed by the Engineer, the branches may be forced into the earth to the 2 ft. depth without necessity of digging the trench. All other conditions shall be observed.

Butt ends of willow branches shall be 1 to 2½ in. diameter; side branches shall be left in place. Branches shall be set in trench so that the mat shall have an even surface, with average thickness of not less than 8 in. near the toe of the slope, and not less than 2 in. at the top or at the high water mark. The gap or space between butt ends shall not exceed 4 in. Smaller diameter branches shall be interspersed with the larger branches to avoid gaps in the mat.

Fifty per cent of poplar branches or other approved live material may be interspersed with the willow branches.

Farm field fence or similar, with minimum wire sizes of No. 9 top and bottom wires and No. 11 wire filler shall be laid over the mat, covering entire mat area when mat is 8 ft. or less in height, and two-thirds distance up from toe of slope when over 8 ft. in height. When two

WILLOW BANK PROTECTION
(SPECIAL ITEM)
① Wood posts 6" round for Mat 8' or over, 4" for less, and 4' to 5' long. Set in ground a minimum of 3'.
② Cloth cement bag or equal. Filled with Class "C" concrete, thoroughly wetted.
③ Woven wire fence. Approved salvaged fence may be used.
④ No. 11 gage support wire.
⑤ Willow mat.
⑥ Forked branches.
8" Max.
Water level (Variable)
3' Min.
Variable
3' to 4'
3' Min.
1' to 2'



★ Details of standard willow bank protection on Ohio

"QUIT WORRYING ABOUT SPECIFICATIONS"

HELTZEL

IS THE ANSWER

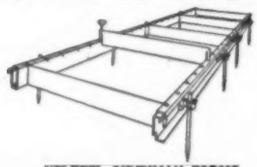
• Thirty-six years of concentrated engineering on concrete construction is at your disposal when you deal with Heltzel. As a result, the chances are, that what you may regard as a special problem is standard with Heltzel engineers. Illustrated here are a few of the basic Heltzel steel forms—many variations are at your disposal.

CURB FORMS

Sections 10' long—either straight or battered face construction. Steel forms for all special concrete curbs.

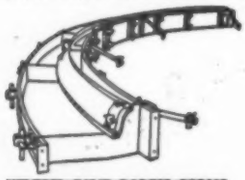
COMBINED CURB AND GUTTER FORMS

Each 10' section consists of 1 back curb form, 1 front gutter form and 1 face curb form, also 2 face curb form supports, 2 round stakes for back form and 2 round stakes for gutter form.



HELTZEL SIDEWALK FORMS

10' sections, slotted every 12" for division plates, which are removed without disturbing side forms after concrete takes its initial set.



HELTZEL RIGID RADIUS FORMS

For building concrete curbs or curb and gutters when all intersections or corners must match. Heltzel forms made in sets to form a specified radius.

HELTZEL FLEXIBLE FORMS

Used when building radius curbs, curbs and gutters or sidewalks where the radius is subject to frequent change or for serpentine work in park areas.

CONCENTRATED *Engineering* IN CONCRETE CONSTRUCTION

Heltzel Steel Form & Iron Company, Warren, Ohio

Send me the following:

[ ] B-19 Steel Highway and Airport Forms

[ ] B-19A Steel Dual Duty Airport Forms

[ ] A-20 Steel Forms for Curbs or Curb and Gutters or Sidewalks.

Name_____

Address_____

City_____ State_____

(Type of construction usually engaged in)

Heltzel
BUILDS IT BETTER

- BINS, Portable and Stationary
- CEMENT BINS, Portable and Stationary
- CENTRAL MIXING PLANTS
- BATCHERS (for batch trucks or truck mixers with automatic dial or beam scale)
- ROAD FORMS (with lip curb and integral curb attachments)
- CURB FORMS
- CURB AND GUTTER FORMS
- SIDEWALK FORMS
- CONCRETE BUCKETS
- TOOL BOXES
- FINISHING TOOLS FOR CONCRETE ROADS

HELTZEL STEEL FORM & IRON CO. WARREN, OHIO · U. S. A.

or more widths of fence are used, they shall be securely tied together with No. 11 wire at 2-ft. intervals. Approved salvaged fence may be used.

After wire is placed forked willow branches shall be driven perpendicular to the slope and to a depth of 2 ft., spaced as shown on the plans, to hold wire in place. These branches shall be 1 to 1½ in. diameter, with one to three side branches 6 in. long left in place as forks.

All branches shall be cut not longer than 24 hours before placing and shall be kept wrapped in wet burlap or heavy cloth until placed. After forked branches are placed, stakes, wires and bags of cement shall be placed as shown in the drawings on the plans.

Measurement for payment shall be the number of lineal feet, measured at the toe of the slope, completed and accepted, and payment shall include all necessary labor and equipment and materials necessary to complete the item.

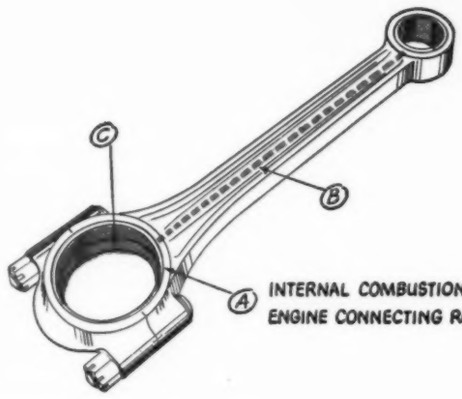
•

Large Dam Job—Bids as follows were received Jan. 19 by Tulsa District Corps of Engineers, Tulsa, Okla., for construction of spillway and completion of embankment, Hula Dam. Coney River, Oklahoma: Mittry Bros. Construction Co., Los Angeles, Calif. $5,174,600; W. L. Johnson Construction Co., Columbus, O. $6,765,677; Al Johnson Construction Co., Winston Bros. and Peter Kiewitt Sons Co., $6,786,239. The U. S. Government estimate was $4,076,890.

Mail Inserted Card or Inquiry Blank (page 133) for Equipment Data

Again this issue of Roads and Streets carries descriptions of many new labor-saving efficiency devices and latest material developments. See our New Equipment and Materials Section beginning on page 118, for which a numbered reply card has been inserted to help you request data on items that interest you. Also on page 133 is an inquiry blank and advertisers' index which will help you get data on equipment and materials you need.

CASE 1018—PROLONGING BEARING LIFE IN HEAVY-DUTY ENGINES.



INTERNAL COMBUSTION ENGINE CONNECTING ROD

In toughest operating conditions, specially compounded RPM Heavy Duty Motor Oil maintains lubricating film on bearings. For both gasoline and Diesel engines. Comes in five grades: SAE 10 to SAE 50.

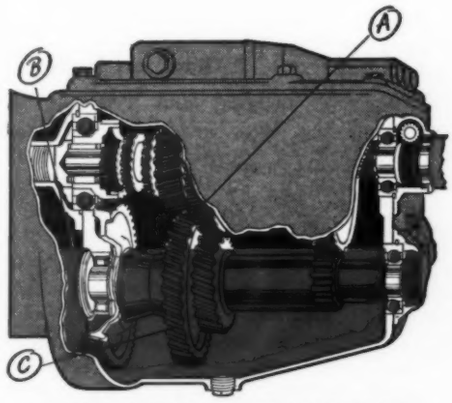
A. Contains anti-corrosion compound. Won't pit or honeycomb copper-lead, cadmium-silver or any other bearing metals.

B. Detergent keeps all oil passages and parts clean. Assures adequate supply of oil to all bearings, prevents ring-sticking and slow action of parts.

C. Adherence to metal surfaces, whether hot or cold, minimizes both running and starting wear. Film stays on idle parts and protects against rusting.

Other compounds in RPM Heavy Duty Motor Oil and natural qualities of selected base oils resist oxidation, formation of sludge and prevent foaming.

CASE 1029--REDUCING WEAR IN CONVENTIONAL AND WORM GEARS.



TYPICAL AUTOMOTIVE TRANSMISSION

Compounded RPM Gear Lubricant satisfactorily met all operating conditions in these gears in cars, trucks and similar machines. Comes in four grades: SAE 80, 90, 140 and 250. (For hypoids, use RPM Multi-Service Gear Lubricant.)

A. Compounds help resist high temperatures and pressures on gears. Minimize deposits and thickening. Make it non-corrosive to metals in gears and cases.

B. No foaming and leaking trouble - contains most effective foam inhibitor known.

C. High affinity for metal maintains lubricating film at all times. Constant oil wedge at gear contact points prevents scoring and extra wear.

RPM Gear Lubricant (Compounded) resists viscosity changes ... allows easy shifting in low temperatures and fast flow of lubricant onto gears.

For additional information and the name of your nearest Distributor, write

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225 Bush Street, San Francisco 20, California

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El Paso, Texas

RPM CALOL

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More Research Highlights

From Recent Annual Highway Research Board Meeting

FOLLOWING are briefs on several additional papers, continued from January R&S:

"Needed Highway Accident Research"—Sidney J. Williams, National Safety Council, suggested that highway engineers, psychologists, doctors, statisticians, and police get together all the facts about the three factors involved in every highway accident—the vehicle, the highway, and the driver or pedestrian. Much more is known about the first two than the third. More information is needed about the relative accident experience of various groups, by age, training, experience, etc. Too little is known about the "accident-prone" driver. How can we detect him and what can we do about him?

Continuous Reinforcement

Continuously Reinforced Concrete Pavements—W. R. Wooley, P R A materials engineer, H. W. Russell, Illinois materials engineer, and William Van Breemen, New Jersey special assignments engineer, each presented a paper on continuously reinforced concrete pavement, the latter two describing experimental pavements recently built in their respective states.

The Illinois project—22 ft. wide, 5½ mi. long—was purposely located under heavy traffic where soil conditions are favorable to pumping. It is divided into eight sections, the only variables between sections being pavement thickness (7 in. vs. 8 in.) and amount of longitudinal steel (from 0.3% to 1.0% of pavement cross-section). There is no center joint, and no transverse joints except those separating test sections; transverse reinforcing bars are continuous across the pavement.

Pressure method tests showed that vibration of that concrete caused air of the air entraining cement to move upward through the concrete, the higher air content being above the reinforcement.

Morning-Afternoon Changes

Numerous fine transverse cracks have developed as expected in the test sections. Strain gages indicate a relatively high tensile stress in the morning accompanied by a measurable opening of the crack, and a reduction of the stress in the afternoon with a closing of cracks.

New Jersey's experimental pavement, which has no longitudinal or transverse joints, is in two sections. One is 5,130 ft. by 10-in. uniform, and has 0.72% longitudinal reinforcing steel. The other section is 5,430 ft. by 8-in. uniform, and has 0.90% steel. Air-entraining cement was used, and 4-in. average slump was specified to facilitate embedment of reinforcement steel. Although deformed bars were originally intended, the shortage of that type of bars necessitated use of welded wire mats with ⅜-in. cold-drawn longitudinal wires 3-in. c. to c. and No. 5 cold drawn transverse wires 12-3/16 in. c. to c.

Last year in New Jersey an additional series of experiments were started to determine the maximum length of slab containing the standard amount of reinforcing steel that can be built with reasonable success. Present indications are that if various causes of cracks are eliminated by means of adequate consolidation and use of proper subbase materials and curing methods, few if any cracks will occur in slabs from 80 to 100 ft. in length. To avoid excessive crack openings in the central part of the slab, length of slab must be limited by the amount of reinforcing steel and the magnitude of subgrade friction.

Cracks and joints of all types in present-day concrete pavements were said to encourage such ailments as pumping, high joints, faulty load transfer devices, corner breaks, and blowups.

Mr. Wooley of PRA thinks that continuously reinforced pavements having heavier than normal reinforcement and no joints would be subject to few if any, of these weaknesses. Available information indicates that 0.5% longitudinal steel may be sufficient to prevent open transverse cracks. Other stresses such as shear may make additional steel necessary. Transverse steel, perhaps slightly heavier than normal, extending across two lanes of payment, should allow elimination of the longitudinal joint and prevent objectionable longitudinal cracking. The cost of such pavement would probably be comparable with that of present designs for heavy-duty roads.

Theoretical Advantages

The advantages of elimination of joints are many, pointed out Mr. Wooley. The bump-bump of uniformly spaced transverse joints will be obviated. The surface will provide a waterproof cover over the subgrade. It is believed that the elimination of joints plus achievement of a watertight surface will prevent pumping. Corner breaks would be unlikely. There should be no cracks to need sealing, thus reducing maintenance and eliminating black lines across the pavement. The initial smoothness should remain more permanent. Elimination of joints and open cracks would prevent saturation of adjacent concrete and hence make the pavement less susceptible to freezing and thawing damage.

Many important questions remain about continuously reinforced pavements, but it is expected that the experimental sections in Illinois and Indiana will give the answer. To what extent will reinforcing steel prevent cracks from opening? What is the tensile stress in reinforcing steel at minimum pavement temperature? In what magnitude of daily and seasonal changes in over-all length will there be an increase from year to year? Will there be a central zone in each section that remains at constant length? How long are these zones? How much reinforcement is required?

Traction Tests

"Braking and Traction Tests on Ice, Snow, and on Bare Pavements"—R. A. Moyer, chairman, Committee on Winter Driving Hazards, National Safety Council, and research professor of highway engineering, Iowa State College, told of results of 1946 and 1947 tests on frozen lakes, on ice and snow covered roads, and on concrete pavements in Michigan and Wisconsin. All of these tests revealed that ice qualities and performance of vehicles on ice are extremely unpredictable and variable.

Of all remedies investigated to prevent skidding on ice and snow, not one provided the margin of safety obtainable on dry concrete pavement.

Some of the conclusions reached: Factors affecting the slipperiness of ice—such as temperature, degree of wetness of ice, relative humidity, wind velocity, degree of cloudiness, condi-

tions under which ice surface was formed, and ice graininess — cause greater variations in braking distances than the factors of vehicle type, load, tires, brake pumping, or power braking. This emphasizes the need for complete ice and snow removal, surface treatment with abrasives, or at least the use of tire chains and greatly reduced speeds.

Vital Safety Data

Braking distances of trucks and passenger cars are about 10 times as long on glare lake ice as on dry concrete, and from 3 to 5 times as long on packed snow. Even with the best chains on all wheels, braking distances on ice are still nearly twice that on dry concrete. Even with the best type of grit and a lock wheel stop, braking distances at low temeratures are reduced only 5 to 10%.

With "pumping brake" technique, best grit reduces braking distance 30 to 40% below the locked wheel stop, depending on whether sanders are used on the rear wheels only or are on all wheels. Because of increased steering control possible by brake pumping, pumping is recommended even for the inexpert driver. "Power braking" can reduce braking distances about 20% for trucks equipped with hydraulic or electric brakes (not effective in trucks equipped with air brakes). Glare ice braking distances with natural rubber tires range from 20 to 30% less than with synthetic tires, and acceleration time through a speed range of 10 mph. is about 25% less with rubber tires than with synthetic tires.

"Expressway Route Selection and Vehicular Usage"—Drawing on experience gained in conducting three comprehensive origin-destination surveys for Indiana, R. M. Brown presented effective methods for selection of urban expressway routes and determination of their percentage of usage by vehicles.

Selection of expressway routes depends primarily upon "major desire line graphs." This study must be coordinated with an intimate knowledge of the city applied to land use, Sanborn and city maps, aerial photos, and an intensive field reconnaissance.

The extent to which vehicles will use a proposed expressway depends on "expressway distance," "access distance," and "adverse distance." Brown defines these three terms and using them as variables developed an algebraic expression for finding the percentage of expressway usage, using graphs to simplify the computation.

Parking Problems

"Commercial Parking"—A. C. Engleland, Jr., Connecticut, reminded that commercial vehicles must park downtown, adjacent to a particular building, to load or unload goods. Too few off-street facilities are provided. Curb parking often impedes the free flow of traffic. Particularly bad is the practice of permitting commercial vehicles to park in otherwise restricted areas. Where curb parking is necessary small loading zones should be created only where regular parking is also permitted.

Realistic regulations written into zoning and building codes should require owners of all new buildings within central business districts to include adjacent off-street parking and loading facilities at time of construction. Existing structures should be required to conform to similar regulations within a given period.

"Fringe Parking"—Adrian Hughes, of Baltimore Transit Co., and F. W. Lovejoy, Federal Works Agency, each discussed this subject which is of special importance to large cities. Off-street parking should be provided as quickly as possible in the downtown section, but this alone will not reduce downtown congestion.

Cities are essential to American life *because* they provide concentration of services, professions, arts, commercial and retail establishments, financial institutions, etc. Accessibility and not decentralization is the need today in large cities.

Both Lovejoy and Hughes think the answer is fringe parking—lot, parking garage, or even parking space on the street at the curb at the perimeter of the downtown business district.

Two facilities are essential to fringe parking—a place or area in the fringe district where cars may park, and a frequent, fast, and convenient public transit service from fringe to business. Obvious factors in choice of parking facility are its location in relation to the parkers' destinations, schedule of parking rates charged, and hours of operation. Regardless of whether the transit service is operated by city or private enterprise, riders must be charged. It is doubtful whether public utility commissions or other transit regulatory authorities will approve transit lines for fringe parking if they are operated at a loss.

Traffic Safety Committee To Map Program

J. J. Newman, vice-president B. F. Goodrich Company recently elected chairman of the Inter-Industry Highway Safety Committee, presided at the committee's January meeting in Detroit to discuss the 1948 program and how to step up participation of automobile industry representatives in traffic safety activities. Mr. Newman succeeded L. W. Slack, formerly with Packard Motor Car Company

W. G. Lewellen, vice-president, General Motors Corporation, has been elected vice-chairman of the national committee. K. B. Elliott, vice-president, Studebaker Corporation, was appointed to the committee by the Automobile Manufacturers Association to replace Mr. Slack.

Headed for the AGC Convention at Dallas, Feb. 9-12. See next issue R & S for Meeting Summary

★ (Right to left): F. W. Parrott, AGC president, who is vice-pres. C. F. Lytle Co., Sioux City, Ia.; H. E. Foreman, Managing Director of AGC; and D. W. Winkelman, AGC vice-pres., who heads D. W. Winkelman Co. of Syracuse, N. Y.

Professional "Economists" Again Advise

By Halbert P. Gillette

WHEN professional economists become an advisory group on national affairs, there is at least a fair prospect that some of their advice will be good; also that most of it will be bad; perhaps as bad as their recent forecasts have been as to the course of postwar employment. Two and a half years ago professional economists were predicting that business enterprises could not give employment to many men released from military service without discharging an equal number of employees. That meant that some 10,000,000 men and women would soon be jobless. Nothing of the sort happened; so now we should be somewhat skeptical when a group of 53 professional economists (mostly college lecturers) present for consideration 18 ways of curbing wage and price inflation.

Consider political purgative No. 1, for example: "A radical reduction in government expenditures; in particular, abandonment of all public work projects except those of an emergency nature." Note those two words: "in particular." Why "public works" in particular? Is it because safe, good highways exist in sufficient mileage and width? Is it because pure water exists in sufficient abundance, and at a pressure that keeps down fire hazards? During four years of war and most of the subsequent time public works stagnated. Is it really economics to continue such stagnation?

Only 10 of the 53 economists would be apt to agree with us that public works should not be regarded merely as a device to give work for otherwise idle hands to do; for only 10 voted against purgative No. 1. The other 43 evidently thought it a splendid cure for price and wage inflation, for they put it ahead of the other 17 cures, and labelled it "in particular."

Perhaps those 43 professional economists would learn a few worthwhile lessons by coming to the Road Show in Chicago next summer. There they would see acres of road-building equipment, much of it in action. Even if they did not let themselves be lectured to by practical economists—the engineers and contractors who direct the use of such equipment—the mere sight of it in use, or even standing ponderously idle, would be apt to tell them how archaic is the idea that roadbuilding is a business that should be postponed until 10,000,000 jobless men are pleading for work.

How many men in such a magnified Coxey's Army would be competent to handle these great road-builders? Or the factory mechanism that produces them and their replacement parts? Or the quarries, the cement mills and the oil wells that keep them busy?

(*Continued on page* 116)

MECHANIZE BEHIND THE FINISHER

For years contractors have emphasized speed at the paver and finisher—and they got it! But, cutting joints, installing material, hand finishing, brooming, belting or dragging burlap, installing permanent traffic lines and spray curing often lagged because of the fast pace ahead. Now, a Flex-Plane machine can solve these problems by handling all operations, individually or in combination. For full information, return coupon from this ad.

FLEX-PLANE machines are available for sale or rental

THE FLEX-PLANE AUTOMATIC SPRAY MACHINE — An example of mechanization behind the finisher. Completely automatic, many contractors are finding it reduces costs. Its perfectly even, controlled coating eliminates all waste of expensive material.

ABOVE—One type of Flex-Plane combination machine which automatically—

- BROOM FINISHES
- INSTALLS PERMANENT TRAFFIC LINE
- SPRAY CURES

CLIP THIS COUPON NOW!

Send me full information on:

_____ Flex-Plane spray and combination machines.
_____ Flex-Plane vibratory joint machine.
_____ Flex-Plane mechanical dowel and tie bar spotter.
_____ Flex-Plane finishing machine.

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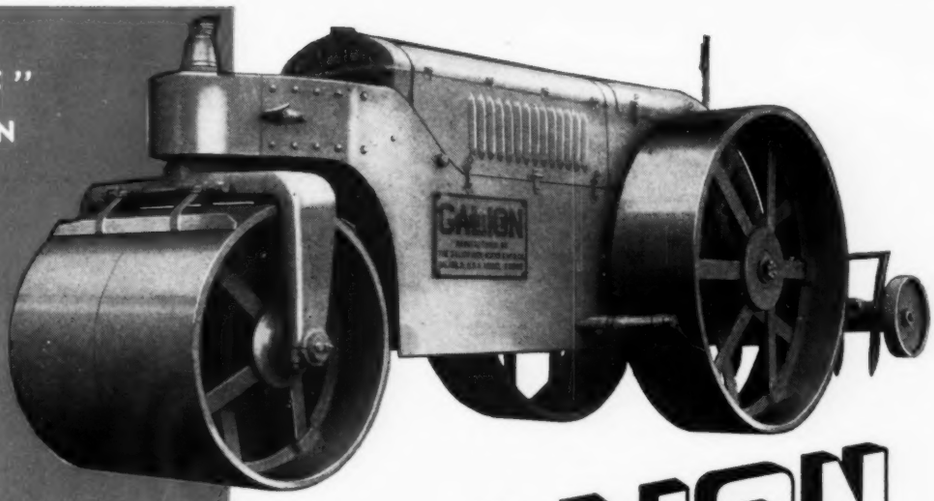
Mail to FLEX-PLANE, Warren, Ohio

THE "CHIEF" 10 & 12 TON SIZES



THE "WARRIOR" 6-7 & 8 TON SIZES

GALION 3 WHEEL-

THE "COMPLETE JOB" ROLLER

Features

- GOOD VISION
- EASY OPERATION
- RUGGED CONSTRUCTION
- LARGE DIAMETER ROLLS
- ENCLOSED TRANSMISSION
- GASOLINE OR DIESEL POWER

Both "Chief" and "Warrior" models are of the same general design and construction. The "Chief" is built larger, more rugged and powerful for heavy-duty service. The "Warrior" is smaller and lighter for medium-duty service.

Write for Catalog No. 294

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UNION-FORMED RIDES BETTER ON GROOVES
. . . does not spin and grind through blocks or over sheaves.
UNION-FORMED HAS GREATER RESISTANCE TO BENDING FATIGUE
...withstands more bends, even reverse bends, because it is more stress-free internally.
UNION-FORMED RESISTS KINKING
. . . because wires and strands are free of internal stress, they do not fight to get out of their preformed positions.
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STRONGER
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U NION-FORMED IS
SAFER TO HANDLE
. . . worn, broken wires do not sp ing out and porcupine but co tinue to lie close to the rope.
UNION-FORMED IS
FLEXIBLE and RELAXED
...bends in any direction, yet has "toughness" to withstand jerking and other punishing strain.
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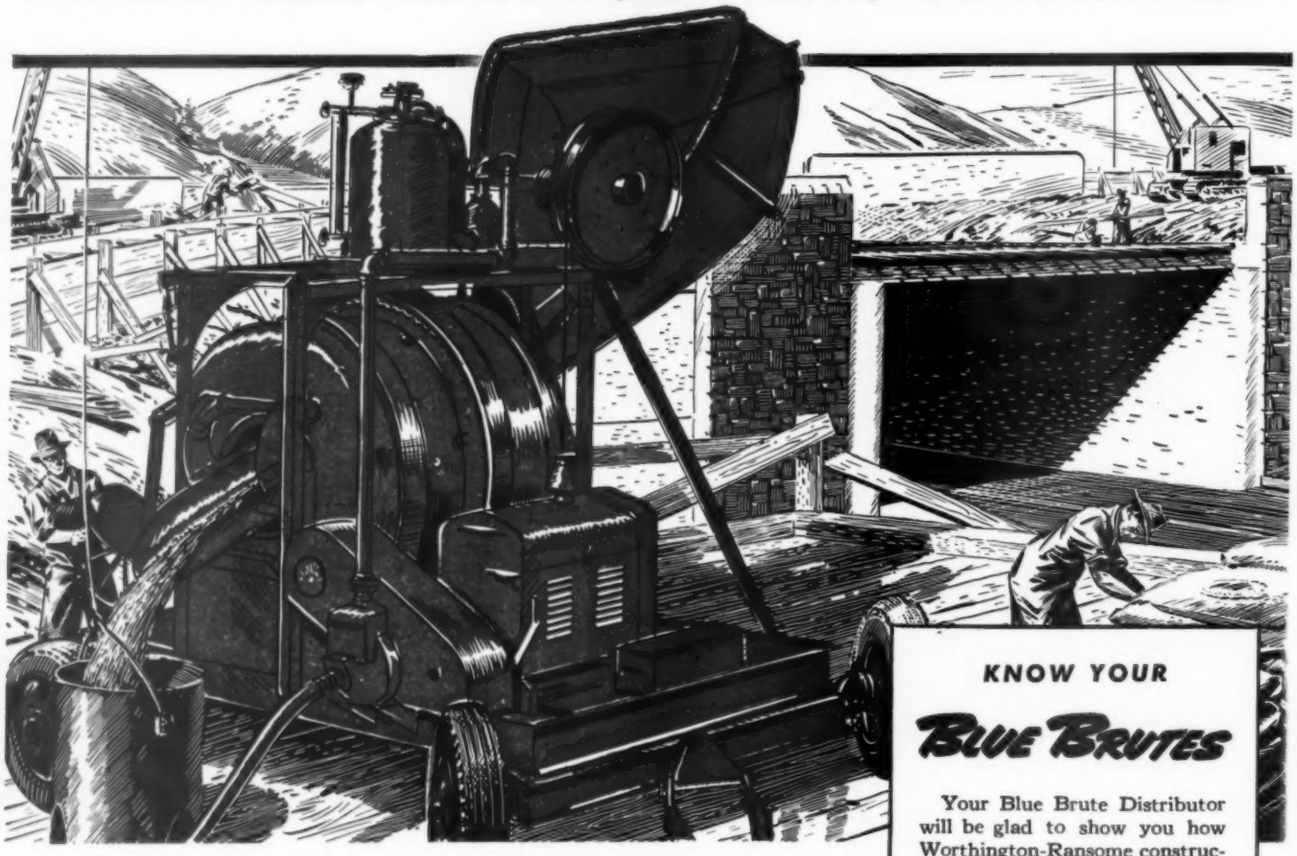
HERE'S REAL "MIXING ECONOMY ON WHEELS"



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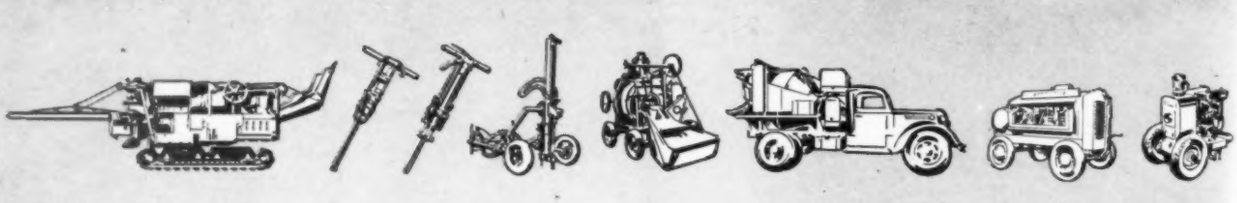


IF IT'S A CONSTRUCTION JOB, IT'S A BLUE BRUTE JOB

Parkway Need Explained

. . . by eloquent and persuasive pictorial booklet, addressed to New Jersey officials and public (see also editorial in this issue)

IN the most complete study ever made of local traffic congestion, state highway commissioner, Spencer Miller, Jr., of New Jersey, has issued a printed report: "New Jersey's First Parkway, Route 4," addressed to "the governor, members of the legislature and people of New Jersey." Impressively illustrated with photographs and charts it represents months of "on the spot" work by the state highway department in cooperation with the PRA.

The districts with the most costly delays in travel are listed as: The North Jersey, Camden and Trenton metropolitan areas, the seacoast and mountain-lake regions.

The publication does not reveal the selection of any fixed course through municipalities for the Parkway on a detailed survey line. It does stress, however, the need of a clear path where the worst travel conditions now exist. In support of this conclusion it asserts:

1. Safety for pedestrian and vehicle occupants is 10 times greater per million vehicle-miles on a Parkway than on urban streets.
2. "Effective Vehicle Capacity" allows a Parkway to accommodate 1,500 vehicles per lane per hour as against 500 on urban streets—a three to one ratio.
3. "Travel Time" on a Parkway at 35 to 40 miles per hour contrasts with 15 to 20 miles per hour on urban streets; 2 to 1 ratio.
4. "Cost of Vehicle Operation," cut in half on a Parkway with urban roads rated at 100%.

The North Jersey Metropolitan Section under the present Parkway legislation extends from Clifton through Passaic, Essex, Union and Middlesex Counties to the Raritan River. In this division are the homes of 1,350,000 people, one-third of the state's population. They live, it continues, within three miles of the "Preferred" Parkway alignment where "a factual study shows it should go through easterly Essex and the counties to the north and south." Two drawings indicate greater density of population in an easterly four mile wide area, compared with an adjacent four-mile width immediately to the west.

Live, Work, Shop, Find Recreation

"The majority of the people," the report sets forth "live, work, shop, find recreation and travel in the preferred four-mile area to the east. Within this area is the population center of the county.

"If the majority of the people of the Essex area are to be adequately served, the Route 4 Parkway must be placed in the vicinity of the preferred location in the easterly four-mile traffic band."

In the query: "Who will use the Route 4 Parkway," an arrow is pointed to the easterly sector of Essex with the caption: "The normal traffic demand at this location is 40,000 vehicles per day."

Another clause avers: "A six-lane parkway can carry traffic volumes in excess of 50,000 passenger vehicles per day. From 14 to 18 lanes of ordinary urban streets would be required to serve the same amount of traffic."

Metropolitan Area totals individual week-day trips by local traffic within Essex County at 32,000 trips per day. Local traffic between Essex and points outside is given 35,000 trips per day. Together they comprise 93% of the travel volume. Essex through traffic is placed at 4,800 trips per day or 7% in the 71,800 grand total of trips per day within and outside the county.

In contrast the Parkway has a caption: "Uniform Traffic Flow."

Other headings are: "Inadequate Thoroughfares and Excessive Traffic Cause Congestion." One costly result of congestion—9661 traffic accidents in 1946. No crossings at grade on a Parkway. The main traffic streams are protected from vehicles that would enter at random. Parkways protect existing community values and create many new ones. Make the community a better, cleaner and safer place in which to live!

In fine, the Route 4 Parkway is listed as a major public and urgently needed improvement. It is needed to accommodate New Jersey's traffic which is estimated to be doubled by 1970.

It will be financed by state and federal funds as part of a modernized system across the state from Trenton and Camden and extending eventually from northern New Jersey to Cape May.

Blight, Deterioration

In the introduction to the report, Commissioner Miller declares:

"The future of New Jersey's well-being depends to a large degree upon the solution of the state's ever-increasing highway transportation problems. Tomorrow's highways must reflect new concepts of design, if they are to meet the necessities of modern conditions.

"A careful study of our existing highways and their use reveals that adequate facilities are lacking for uninterrupted travel, particularly in centers of high traffic density. Despite every effort to solve the problem of congestion in urban areas, the condition is becoming increasingly critical. Recent surveys show that extended blight and deterioration in metropolitan centers are directly related to this situation.

"Traffic congestion is not limited to urban areas alone. The 'Ribbon development' is rendering inadequate large portions of the highway system. As a result, many routes are dangerous; ugly and blighted; incapable of carrying uninterrupted traffic flow.

"Modern highway engineering indicates but one solution to the problem—controlled access Parkways and Freeways."

•

Arkansas' adoption of highway size and weight limits recommended by the American Association of State Highway Officials took effect Feb. 1. These provide a single unit length of 40 ft., a tractor semi-trailer length of 50 ft., and other combination lengths of 60 ft. The weight limit remains at 18,000 lb. per axle.

1 Spreading blanket course 6 in. to 12 in. thickness—sub-base for new roadway

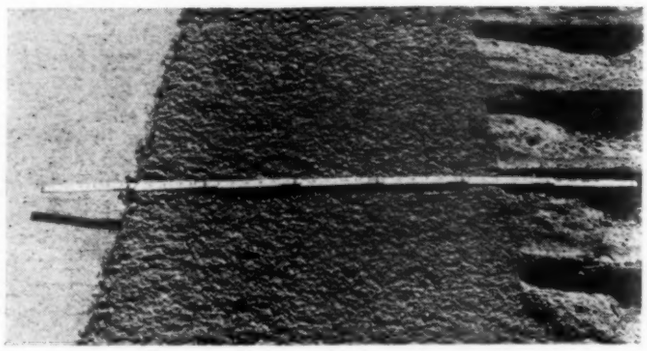
Step-by-Step in Photos:

The seventeen photographs reproduced here clearly depict the highlights of methods used by S. E. Johnson Company on this efficient and fastmoving project. Photos by Luke Brannon of the Ohio department of highways

Labor Saving Methods Speed

Contractor spread 1000 to 1150 tons of base stone daily for new 2-lane road. Old parallel waterbound macadam roadbed salvaged on major scale on 4-lane Ohio project

By C. R. Hanes
Field Engineer,
Ohio State Highway Department,
Columbus

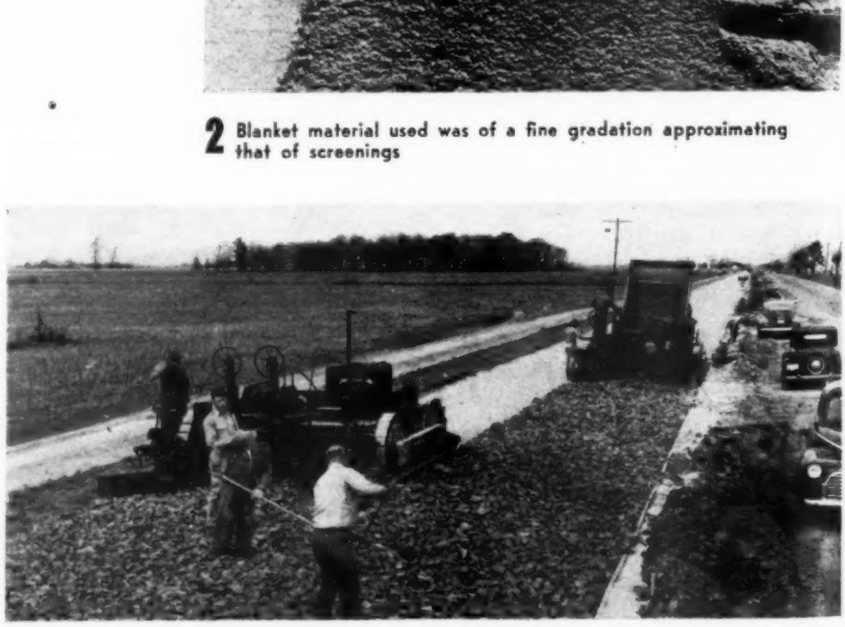


2 Blanket material used was of a fine gradation approximating that of screenings

SALVAGING of an old macadam roadway, and use of labor-saving methods on waterbound macadam for a new parallel roadway, lent special interest to a "four-laning" project recently completed on U.S. 25 (Dixie Highway) south of Toledo.

The improvement in general consisted of building a new 22-ft. roadway to carry southbound traffic, while traffic was maintained on the old paralleling pavement, which was later widened to serve as the northbound roadway in the ultimate divided highway. This construction was practical since the alignment and grade line of the old pavement were found to be generally satisfactory for present day demands. The 1946 traffic count for this section was 4620 vehicles. Recent 1947 traffic count showed 5668 vehicles for a 24-hour day, of which 884 were trucks.

This project was started Aug. 27, 1946, by the S. E. Johnson Company of Toledo, Ohio. Work proceeded into



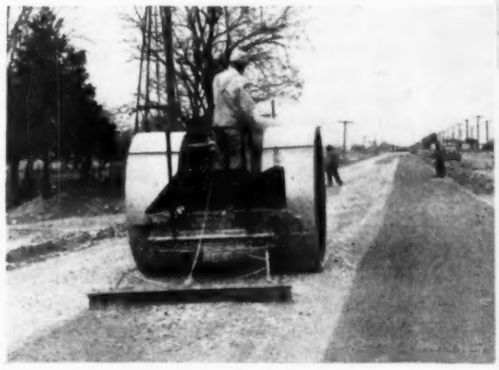
3 Spreading coarse aggregate for waterbound macadam; bituminous pavers adapted to this use by contractor

4 Spreading with adapted machines permitted accurate control of crown and grade, eliminating most traditional hand-raking

5 Part of the necessary adjustment by contractor for spreading this depth aggregate (5 in. compacted depth, 1st base; 4 in., 2nd base) consisted of building up the wheels as indicated

6 Screenings were spread with a fast-traveling spreader

W. B. Macadam Job



7 Rolling and sweeping in screenings

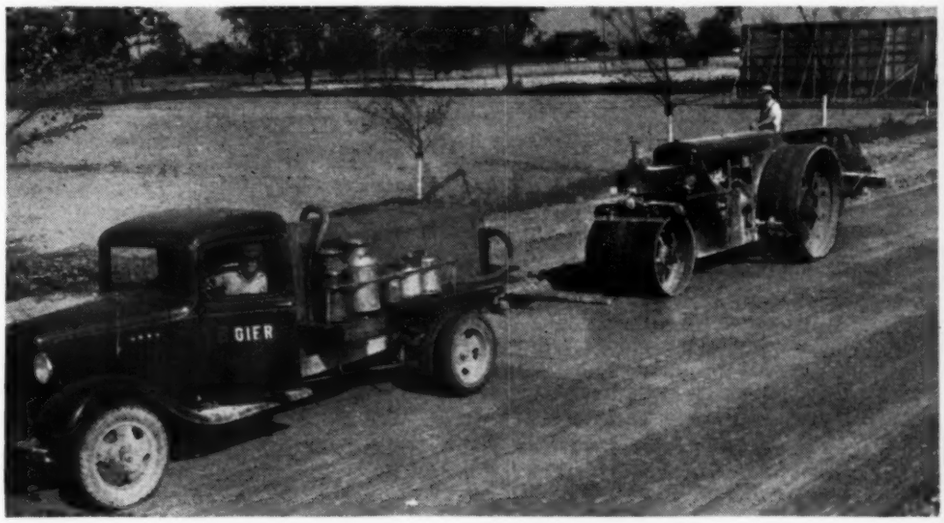
late fall, carrying over into 1947, and necessitated development of methods to save labor in an area where labor is scarce.

Typical new-pavement sections of the project consisted of a 6-in. to 12-in. blanket course; a 5-in. and a 4-in. waterbound macadam base course; and a 3-in. surface of asphaltic concrete 22 ft. wide.

Roadside Ditch Enclosed

The old paralleling 18-ft. macadam was widened with waterbound macadam and resurfaced with asphaltic concrete to provide 22 ft. width. The construction of the additional two lanes to serve as a part of a modern divided highway is the final step in long range planning and stage construction.

The area through which this project extends approaches a level condition. Excellent soil provides ideal farming conditions when drainage is available. Drainage was originally made possible by the construction of open ditch sections for the main channels. These were generally located along highways as a convenient place least damaging to farm lands. In order to provide the necessary fall these open channels became quite deep when carried for an appreciable distance. These were not particularly objectionable when originally constructed. However, with the advent of the automobile and demands for increased pavement widths, the deep roadside ditches were a definite hazard to traffic and barriers to widening.



8 Waterbinding a base course

9 Laying asphaltic concrete binder course; two finisher units kept near each other to eliminate cold joints

Elimination of ditches was effected with concrete pipe 54 in. to 66 in. in diameter placed along the old pavement. Pipe was installed under a previous contract. As a result, actual pavement operations could be started

10 Excavating for widening original 18-ft. pavement parallel to new roadway. Care used in excavating to edge with grader to avoid disturbing old pavement. New southbound lanes appear on the left

11 Placing coarse aggregate for waterbound macadam widening, using self-propelled spreader adapted by contractor. Belt conveyor carried aggregate to edge

on the recent project with a minimum of delay.

New Macadam Features

The waterbound macadam type of base construction designed for the new roadway on this project is not new. Several features in the design departed from the usual, however, and construction methods used differed materially from the old accepted methods used 30 years ago.

In designing the new roadway, an object lesson was taken from the old. The old 18-ft. pavement, which now carries northbound traffic after widening and resurfacing, served traffic well for approximately 30 years. The old macadam base courses averaged 11 in. thickness. This type of construction had permitted the base to adjust itself to varying traffic demands for many years. The original surface had been built up by successive applications of surface treatments until it had an average thickness of 4 in.

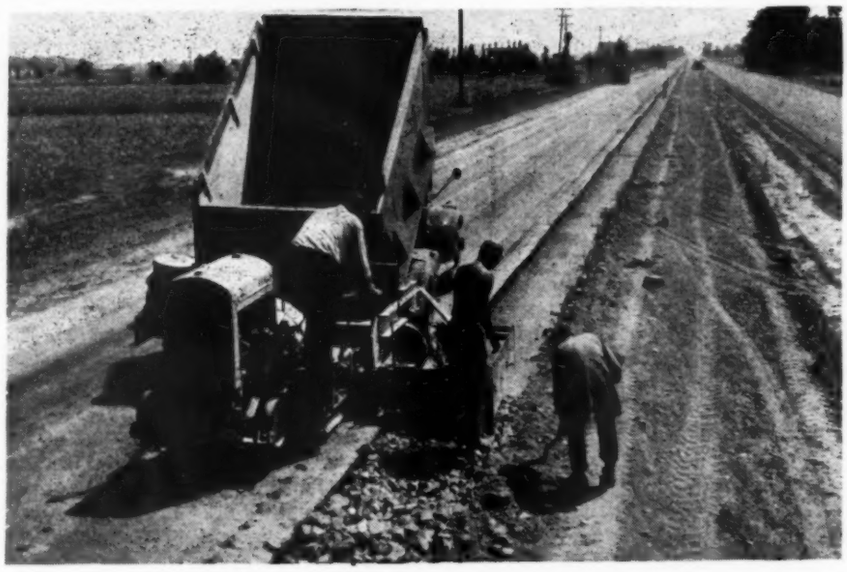
In order that the same degree of stability might be attained immediately in the construction of the new southbound lane, a variable 6 to 12 in. blanket of sub-base material was designated. This granular course is drained with 6-in. pipe underdrain, with porous backfill as indicated by the accompanying plan details. Placing of this granular sub-base permitted placement of waterbound base course to continue until Dec. 4, 1946, which is beyond the usual construction season for this type of work in this locality.

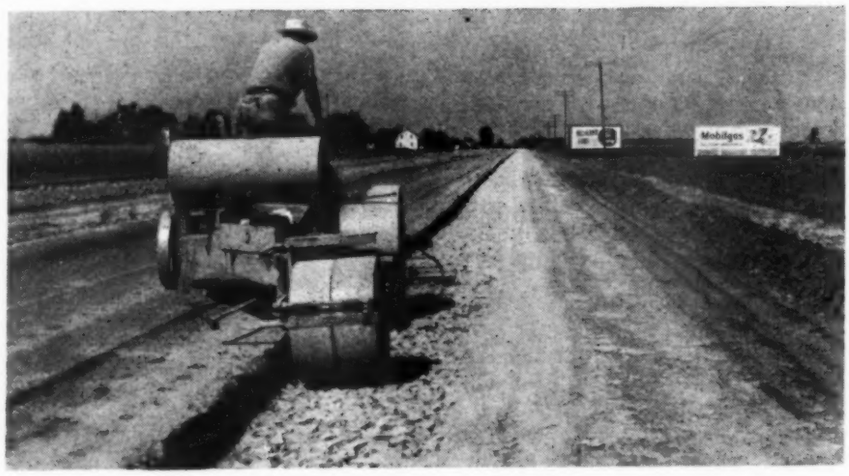
Contractor was permitted to furnish material meeting one of the gradations shown for the classified blanket course.

The area has many limestone quarries, and hence screenings which met the finer gradation permitted were chosen for the sub-base material.

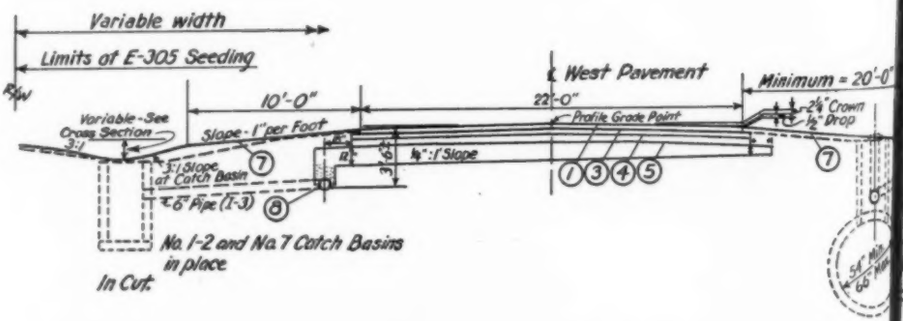
Labor-Saving Methods

In meeting the challenge of a labor shortage, along with the necessity for laying approximately 70,000 tons of waterbound macadam courses, the contractor first developed a method of spreading the coarse aggregate which permitted accurate spreading





12 Rolling of widening was accomplished with a 20-in. width trench roller and standard 3-wheel roller



13 Placing screening for choking macadam widening strip. The truck bed was blocked off

14 Rolling with standard 3-wheel roller. Note narrow broom

and strike-off with speed and minimum hand labor for raking (raking was a large item on macadam work in earlier years). No machine was available for accomplishing this particular spreading job in the manner desired, so the contractor proceeded to modify his available equipment. Two Jaeger bituminous pavers were changed by building up the wheels and shoes, in order to permit laying the necessary depths, and by removing the screed and screw conveyor equipment previously used for bituminous material. This provided a self-propelled machine, which could accurately lay stone to section, and at the same time maintain a grade.

These machines were used alternately to spread the coarse aggregate, one operator being able to operate both machines. Three men were used back of the machines, where most of the necessary work was required at the center of the section. It was possible to quickly and accurately spread aggregate by this method with a minimum of labor, and do it much faster than it was possible to carry on the necessary follow-up operations such as rolling and screening.

Spreading materials for the first 5-in. base course reached a peak rate of 1055 tons of coarse aggregate per 9-hour day, or 1855 lin. feet. 23 ft. wide. The second base course (4 in. thick) was placed at peak rate of 1157 tons per 9-hour day, extending 2405 lin. ft. x 23 ft. wide.

Side forms were set to grade as required by specifications. However, as a result of experience gained on this and other projects where self-propelled spreading and leveling devices were used, the employment of forms has been waived in recent specification modifications.

Widening Old Macadam

Excavation for widening the old 18-ft. macadam was performed by a blade grader, which gradually cut away the shoulder material to subgrade depth. As this operation approached the edge of the old metal, extreme care was exercised to avoid disturbing that material. The edge of the old metal was somewhat distorted due to the heavy truck traffic on this route and for that reason it was estimated that an average of 16 ft. of width would be satisfactory for salvage. This estimate proved to be about right.

Coarse aggregate for widening was also spread with a self-propelled spreading and leveling machine, built for this use by the contractor. The machine was built around the chassis of a Cleveland Trench Tamper unit, which travels on crawler treads. An endless conveyor-type belt was built into the machine to carry the coarse aggregate to the widening trench. This device permitted rapid spreading of the aggregate to cross-section.

Coarse aggregate was spread at the rate of 604 tons per day, or 5025 lin. ft. of 5-in. course, averaging 4 ft. wide.

Compaction of the widening aggregate was possible by a standard 3-wheel 10-ton roller, since the existing shoulder was cut down to such level that the roller might be operated from the shoulder. Trench roller units, operated from the old pavement, also aided in rolling and screening the widening material. Rollers of this type are required where the widening is inaccessible to a standard roller.

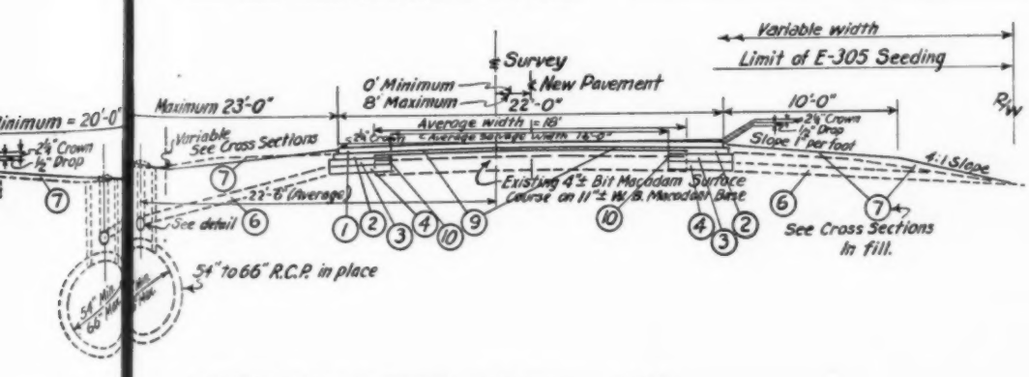
Screenings for both the full-width new construction and the widening sections was spread with a Buckeye spreader, which permits a light uniform application. Usually it was found that six or seven applications of screenings were necessary to completely fill the coarse aggregate.

Laying Hot-Mix

Laying of the asphaltic concrete surface course was permitted with the paver type finishers, not requiring the use of forms. The contractor used two Barber-Greene pavers, spreading loads alternately, and thus keeping them as close together as possible. This method of laying eliminated a cold joint and permitted full rolling across the entire section, which was of considerable importance in laying a uniform surface. The second machine lapped the adjoining spread by about one inch, and no hand-raking was necessary to provide a satisfactory joint. This method of laying

Permissible Blanket Course Gradation

Sieve	Total Percent Passing Grading A.	Grading B	Grading C	Grading D
3 inch	100			
2 inch	30-70	100	100	100
1 inch		70-100	70-100	
½ inch		40-100		
⅜ inch	15-40			
No. 4		0-40		
No. 10	0-15	0-15	35-75	50-90
No. 50			0-10	0-20



15 Original project prior to elimination of open ditch with 54 in. to 66 in. diam. concrete pipe

16 After elimination of open ditch and grading for future divided construction

proves satisfactory where plant production warrants the use of the two pavers. Production averaged approximately 900 tons per day when pavers were laying to the best advantage.

A zero minimum leveling course was laid on the old pavement section prior to laying the regular leveling or binder course. This course eliminated most of the objectionable irregularities in the old pavement.

Closing Observation

Shoulders and slopes were seeded upon completion. The completion of this project emphasizes the possibilities of salvage construction when the over-all picture is carefully analyzed before work is started. We have thought of the macadam type of construction as associated with horse-and-buggy days to the extent that methods of construction have not kept pace with modern construction practices. The construction of this project emphasized the fact that modern methods and equipment will develop as conditions warrant. We, as highway builders, should maintain flexibility in our thinking and specifications in order that we take full advantage of improvements in equipment and methods.

The foregoing project was carried out by the Ohio department of highways, Murray D. Shaffer, director; Homer E. Anderson, chief bureau of construction; W. B. Robinson, division engineer at Toledo; E. B. Bauer, division construction engineer; John Fisher, supt. in charge for the contractor.

Tables Give Correct Chloride Applications

The Highway Research Board's Current Problems Bulletin, "Recommended Practice for Treatment of Icy Pavements," has been re-issued in a revised edition No. 9-R, dated November, 1947. As noted in the preface, this comprehensive summary, originally issued as a Wartime Problems Bulletin, now includes a table of quantities. Reproduced herewith, this table gives the correct amounts of chloride to be mixed with abrasives to produce maximum results when moisture content and temperature are considered.

Also reproduced here from the bulletin is a table showing recommended treatment for brine-sprayed dry or damp sand or stone screenings, stored and used in cold weather. As stated in the bulletin, sodium chloride may be used in the form of a brine spray as described for calcium chloride, except that it is not recommended for use in climates or during seasons when temperatures below 0° F. might be encountered.

TREATMENT FOR BRINE-SPRAYED DRY OR DAMP SAND OR STONE SCREENINGS STORED AND USED AT TEMPERATURES BELOW 20°F.
(BASED ON TOTAL ABSORPTION OF 18 GAL. PER CU. YD.)

Brine gal. per cu. yd.	$CaCl_2$ lb. per cu. yd.	Add. $CaCl_2$ for +10°F. lb. per cu. yd.	Add. $CaCl_2$ for -5°F. lb. per cu. yd.	Add. $CaCl_2$ for -20°F. lb. per cu. yd.
6	24	16	26	36
8	32	8	18	28
10	40	0	10	20
12	48	0	2	12

TREATMENT FOR SAND OR STONE SCREENINGS WHEN PLACED IN STORAGE

H_2O in Abrasives before Treating	Lb. 77-80% Flake Calcium Chloride per Cu. Yd. Predicted Minimum Temp. +10°F.	0°F.	-10°F.	-20°F.	Lb. Sodium Chloride (Rock Salt) per Cu. Yd. Predicted Minimum Temp. +10°F.	0°F.	-5°F.
4%	15	20	30	35	20	30	35
6%	25	30	40	50	30	40	50
8%	30	40	55	65	40	55	65
10%	40	55	70	80	50	70	80
TREATMENT FOR CINDERS							
15%	20	30	40	50	30	40	45
20%	30	45	55	70	40	60	65
25%	40	55	70	85	55	75	85
30%	50	70	90	100	70	95	105

No Protection Below -6°F.

Percent H_2O calculated on wet basis.

17 Completed project—completely new southbound lanes on the left; original 18-ft. pavement on right widened and resurfaced to provide 22-ft. width for northbound traffic. Depressed median 20-23 ft. in width, shoulders and slopes seeded

Roller Bearing Maintenance

Installation — Care — Removal — Inspection. This valuable and practical summary is reproduced with permission from the Hyatt Roller Bearing Handbook.

Roller bearing maintenance includes the care and handling of a bearing through all the stages of its useful life. It starts at the point of manufacture with the washing of the bearing parts, the application of rust preventive coating or lubricants, and the wrapping and packing of the bearings to prevent exposure to corrosion and contamination

Introduction

THE necessity for careful maintenance practice becomes increased when once the bearing has been removed from its wrapping. Because of the danger of damage from dirt, the manufacturers of bearings have continually advocated that bearings be kept in their original containers until ready for use.

After the shaft and housing have been suitably prepared, the bearing must be installed in such a manner as to prevent any damage to the component bearing parts.

Once the bearing has commenced to operate, maintenance should continue in the proper lubrication and the protection against injury by dirt, dust and fumes.

Maintenance also covers the selection of the proper lubricant and the insurance of a sufficient supply of lubricant, protected from contamination by dirt and moisture. It also covers the procedure involved in removing bearings for inspection or cleaning during overhaul, the manner of cleaning them, and their protection while idle. In fact maintenance ends *only* when the bearing has been discarded because it can no longer save any useful purpose.

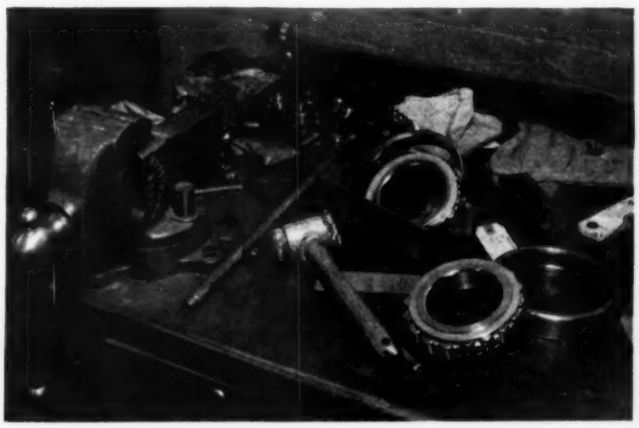
Removal of Bearings

Bearing pullers are a useful and convenient means of removing bearings and races. Where no arbor press is available, or where the shaft is too large or is obstructed and cannot go into a press, the bearing puller furnishes a satisfactory and relatively inexpensive substitute.

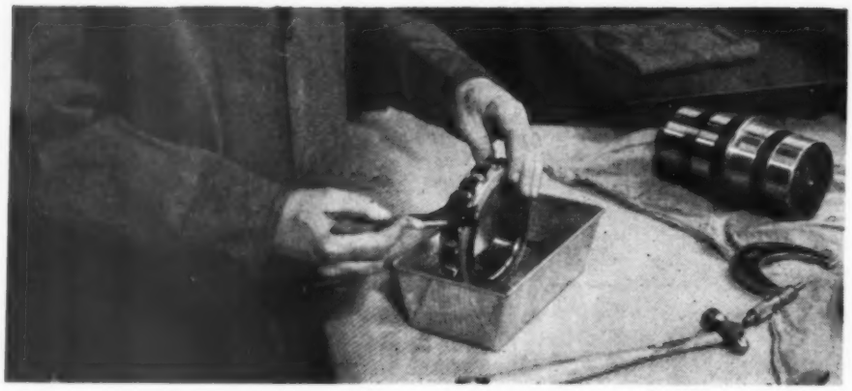
Driving as Means of Bearing Removal

The removal of bearings or races by driving with a hammer is the most common method used, but it is the least desirable. It should only be resorted to when no other means is available. The reason for this is that driving can most easily cause injury to the bearing and to the serviceman. However, there are a great many

★ Work in clean surroundings, with clean tools and clean hands



★ Avoid chipped or dirty tools and working in unclean surroundings



★ Carefully clean bearings before storing

occasions, especially in field service, where no other method can be used. By close observance of the rules listed below, the danger of injury to bearing and operator can be largely eliminated.

1. Wherever possible, mount the shaft or housing in a vise. Use wood blocks, leather or soft metal guards to protect the shaft or housing from injury by the vise jaws.

2. Do not use wood or very soft metals to drive the bearings or races as splinters or chips broken off may find their way into the bearing.

3. Do not drive directly on races, cages or roller assembly.

4. The driving force must always be directed against the face of the press fitted race to avoid damage to separators, rollers or bearing operating surfaces.

5. If none of the accessories described in this article are available, a soft steel drift may be used to tap off the races. Avoid using a blunted cold chisel as harm to the bearing or to the person removing the bearing may result.

6. In driving, use smart, quick taps, rather than heavy blows. This will prevent the race from cocking and harming the shaft.

7. Tap alternately on opposite sides of the race to make sure that the race will move uniformly off the shaft.

8. Work in clean surroundings with clean tools and with clean hands.

Grinding and Splitting—When no other method of race removal can be used, as where no provision is made for gripping the race, the race must be completely destroyed. This must be done in such a manner that the shaft is not injured, and usually involves grinding or burning the race partially through with a grinder or acetylene flame. This may sufficiently reduce the pressure between race and shaft and permit easy removal, or it may be necessary to crack through the rest of the way with hammer and cold chisel. The chisel should not be directed straight down toward the shaft, but rather tangentially against the side of the groove which has been cut in the race. With small races mounted on such shafts, a sharp blow may be enough to crack the race. It must be emphasized that in all operations of this kind there is considerable danger of injury, both to the operator and to the shaft.

Other Means of Bearing Removal

Heating bearings to remove—When the force necessary to remove bearing parts is greater than the capacity of the available equipment, heat may be used to assist in removing the races from their shafts. Heating is *not* generally recommended because of the danger of overheating, temper drawing, and the development of soft spots leading to failure when the bearing is later operated. Where the race to be removed has already failed or is not intended for further use, precautions must still be taken to protect the shaft from overheating.

The best means of applying heat is by pouring hot oil over the race. It may be necessary, however, to use a direct flame from a blow torch. *In no case can the race be heated beyond 300 deg. F. without danger of softening.* Wet cloths wrapped around the shaft may prove effective in carrying away excessive heat.

Driving with Pipe or Tubing—Sections of pipes or tubes are the simplest accessories that can be used to aid in driving a race or bearing off a shaft or out of a housing. The size of the pipe or tube should be such that only the race through which the driving force is being directed is contacted. The inside diameter of the tube should be only slightly larger than the shaft so that the shaft can act as a guide and prevent the tube from injuring the snap rings or separator. A steel block may be used as a cap to distribute the force of the hammer blows over the end of the tube.

Pipe or Tubing with Long Shafts—If the shaft is too long to use a pipe and steel block conveniently, lugs can be welded on two opposite sides of the pipe. The driving is done against these lugs, and should be done on opposite sides alternately, in order to move the race off uniformly. Where obstructions prevent the tube or pipe from being slipped over the shaft, this tube can be split and the two halves assembled around the shaft where they can be held together by means of wire, steel bands or heavy cord.

Driving with Blocks—Drive blocks are preferable to pipes or tubing, but their use is limited to certain applications or conditions. They cannot be used with very large bearings or where the back face of the inner race is obstructed. They are a neat, positive means of bearing removal in which the danger of damage to the bearing is relatively small.

Storage Cleaning

Bearings packed for quantity shipment should *not* be removed from their boxes until ready for installation. Then, only one stack, or roll, should be removed at a time and the individual bearings removed from the roll as they are needed. Service packaged bearings should be stored in their unopened cartons. The cartons should not be stacked too high, to prevent damaging the lower packages by crushing. In all cases, the site selected for storage should be free from excessive heat and moisture, and out of dusty or corrosive atmospheres.

Used Bearings

Bearing Cleaning—Bearings which have been removed from service should be cleaned before storing, even when the storage is to be only of short duration. The bearing should be cleaned thoroughly, to remove all oil and hardened grease accumulations, as well as any sludge which may be deposited on the outer surfaces of the races. Remember that cleaning bearings is an important part of the removal, inspection and storage of bearings, and should be done before re-lubricating wherever possible.

Rust Prevention—The prevention of rust on used bearing while in storage is essential if further usage of the bearing is to be expected. Bearings which rust on the operating surfaces will have the rust flaked or rubbed off in operation. Pitting will develop at these places, resulting in early bearing failure.

The easiest method of preventing rusting of a bearing is by keeping a coating of oil or light-bodied grease on it when it is not in use. Before applying this protective coating, the bearing should be wiped clean and dry, because corrosion may take place under this coating. Corrosion may be caused by handling the bearing with hands that are moist or perspiring, and fingerprint pattterns are sometimes found rusted into the bearing surfaces, under the oil or grease.

Storage Overnight—Bearings may be removed from applications one day, and the opportunity to re-install them not occur until the day following. Their protection overnight is necessary because in humid weather severe rusting can take place in that short time. If bearings are free from shafts or housings and are not too large, they can best be stored in closed pans or boxes containing enough oil to cover them. Otherwise, they should be freely coated with oil or grease and wrapped in clean cloths or newspapers.

Long-term Storage—When bearings are to be stored for periods longer than a few days, every effort should be made to give them the protection given a new bearing. If a bearing can be conveniently stored, as described above, in a tightly covered pan of oil, that is sufficient protection. If not, the bearing should be covered with a coating of light-bodied grease or petrolatum, wrapped in an oilproof paper or cellophane, and placed in a pasteboard box or carton. *Storing in a pasteboard box without oilproof paper, or wrapping in newspaper is unsatisfactory because in such cases the oil is quickly absorbed by the paper and the protection against corrosion is soon lost.*

Things to Avoid

1. Working in dirty surroundings.
2. Using dirty, brittle or chipped tools.
3. Using wooden mallets or working on wooden bench tops.
4. Handling with dirty, moist hands.
5. Using gasoline containing tetraethyl lead, as they may be injurious to health.
6. Spinning uncleaned bearings.
7. Spinning bearings with compressed air.
8. Using cotton waste or dirty clothes to wipe bearings.
9. Exposing bearings to rust or dirt at any time.
10. Scratching or nicking of bearing surfaces.

Bearing Cleaning Methods

Cleaning Installed Bearings—Bearings can be cleaned easier and more thoroughly when they have been removed from their housings and shafts. When this is not possible, a light oil heated at 200° F. should be flushed through the housing while slowly rotating the bearing. Where the grease or oil is badly oxidized and cannot be removed by this method, a petroleum solvent such as kerosene or safety-naphtha may prove effective. In extreme cases, a mixture of alcohol and kerosene or safety-naphtha will remove the greater part of the sludge and scale. When petroleum solvents, by themselves or with alcohol added, are used in this manner, they should be followed by a flushing with light oil before the lubricant is added to the housing. This will wash away any of these solvents which would otherwise dilute the lubricant.

Cleaning Dismounted Bearings—where it is possible to dismount the bearings, they should be placed in a metal basket and suspended in a container of some clean, cold petroleum product. There they should soak, if possible, overnight. If no metal basket is available, the bearings may be suspended in the solution by a length of wire. Do not let the bearings rest on the bottom of the container. If the lubricant is badly oxidized, the bearings should be soaked in a light oil heated at 180° to 200° F., and the basket or wire sloshed through the oil slowly as often as possible. In cases of extreme sludging, the bearings may be soaked in a mixture of alcohol and kerosene or safety-naphtha.

In cleaning bearings, use plenty of clean rags for wiping and handling. **Do not use cotton waste as the short threads may get into the bearings.**

Brushes and Compressed Air—A brush may be useful in helping the oil or solvent to remove dirt, scale or chips from bearings. Care should be taken that none of the bristles become lodged between the rollers and races, because a piece of bristle can be as harmful as a steel chip. Compressed air which is entirely free from condensed moisture may be used to blow out bearings, but only after all dirt and chips have been removed by sloshing or brushing. It is a dangerous practice to spin the bearings with compressed air as any dirt or chips present will cause indenting of the raceways.

After bearings have been cleaned, they should immediately be protected from corrosion and dirt by coating with oil or light bodied grease, and wrapped in oilproof paper.

Things to Remember

1. Remove all outside dirt from housing before exposing bearing.
2. Treat a used bearing as carefully as you would a new one.
3. Work with clean tools in clean surroundings.
4. Handle with clean, dry hands or, better, clean canvas gloves.
5. Use clean solvents and flushing oils.
6. Lay bearings out on clean newspaper.
7. Protect disassembled bearings from rust and dirt.
8. Use clean rags to wipe bearings.
9. Keep bearings wrapped in oilproof paper when not in use.
10. Clean inside of housing before replacing bearings.

Bearing Cleaning Materials

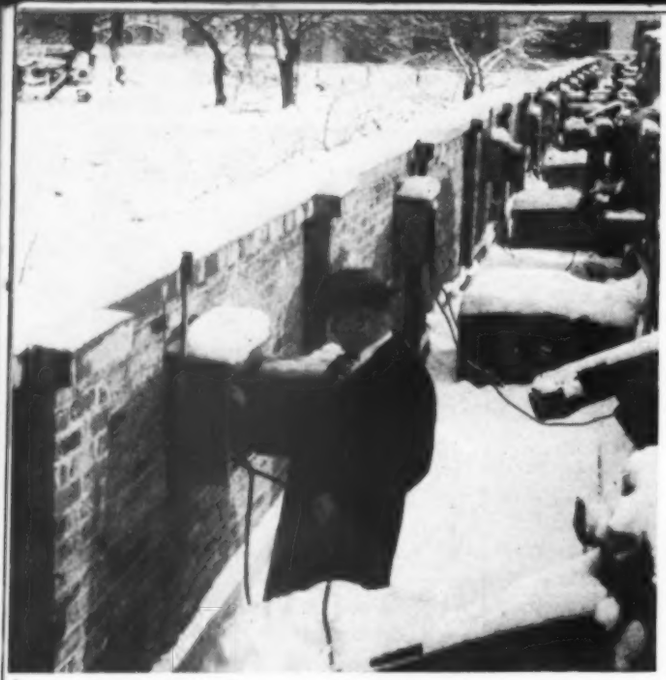
Petroleum Products—Light transformer oils, spindle oils, or automotive flushing oils are most suitable for cleaning bearings under ordinary conditions. *Oils heavier than SAE 10 should not be used.* Kerosene, gasoline or high flash point naphthas may be used with suitable precautions against fire. Gasolines which contain anti-knock compounds, such as tetraethyl lead, should *not* be used as they constitute a danger to health unless adequate precautions are taken.

Solvent Cleaners—Bearings covered by an especially hard crust of oxidized grease or sludge may require soaking in carbon tetrachloride. This and all other chlorinated solvents are not recommended for general use as they evaporate very rapidly leaving the bearing surfaces entirely free of any protective oil film. Under these conditions, rusting can develop quickly.

Commercial varnish removing compounds have been found effective in removing the oil stain or "varnish" resulting from operation at high temperature. The bearing should be protected immediately after cleaning by a coating of antirust oil or grease.

●

Techniques of Stress Measurement—The Annual Meeting of the Society for Experimental Stress Analysis will be held at the Roosevelt Hotel, Pittsburgh, Pa., May 27, 28, 29, 1948. Inquiries should be addressed to the Society for Experimental Stress Analysis, P. O. Box 168, Cambridge 39, Massachusetts.



★ How motor warmers are plugged in at one of Chicago's parking lots

Chicago City Street Department Equips 350 Trucks with Motor Warmers

Warmers are city's wintertime answer to garage shortage; shop-built immersion-type units used at three city parking lots to speed morning starting and reduce motor wear

T. C. EPPIG, superintendent of equipment, Chicago department of streets and electricity, makes no bones about it. Although he's pleased with his shop's new home-made electric engine warmers, he'd like to see the city's 400 garbage and ash removal trucks tucked away in cozy garages every night. But adequate garage facilities are not available. Building large storage garages would take a lot of money and a lot of time even to satisfy present needs. So Chicago parks her ash and garbage trucks outdoors in six locations on or adjacent to the city's dumping sites.

Batteries are notorious for being only 20-50% as effective in cold weather as in warm. Starting a cold motor on a winter morning is often a chore. At each parking site one tow truck is ready for action. During cold weather a few men are detailed to report an hour early in the morning to start all motors. Now the city is equipping its trucks with electric engine warmers and installing electric outlet facilities at the parking locations.

Ease of starting, of course, depends a lot on truck conditions. Careful maintenance keeps the city's equipment in good running condition. Every 1,000 miles—or about once every six weeks single shifts—and once a month for double shifts—the trucks are brought in for motor tuning, greasing, washing, battery hydrometer test, and general check-up.

Investigation of many types of engine warmers has convinced the department's personnel that the most practical and least expensive type of engine warmer would be the immersion type, which acts on the thermo-syphon or percolator principle. Several tests were made to determine the proper element size, required wattage and best motor hook-up method. Best results were obtained by hooking into the lower front of the motor block with a ⅜-in. nipple, to which was affixed a rubber hose, coupling it to the engine warmer jacket mounted on the engine sub-frame. Another connection was made to the rear upper block with a ⅜-in. nipple and rubber hose, which in turn was connected to the outlet end of the engine warmer jacket. It was found necessary to increase the original opening at the lower front of the engine blocks from ¼ in. diameter to ⅜ in. A removable plate at the rear top of block readily permitted drilling at this point.

Shop-Made Jacket

Although there are several manufactured engine warmer jackets of light-weight, corrosion-resistant aluminum alloy, the city decided to make its own jackets. The simple jacket assembly used, having a housing capacity of 32 cu. in., consists of a 1½ in. x 6 in. standard pipe nipple fitted on both ends with 1½ in. tees. The tee on the inlet side is attached horizontally to the nipple, thus permitting the heater element to be inserted through the tee into the pipe nipple. The top of the tee is equipped with a bushing to permit the insertion of a ⅜-in. nipple to which is affixed the hose which in turn is connected to the nipple in the lower end of motor block.

On the outlet side of the assembly the tee is also assembled in a horizontal position. At one opening a bushing is fitted in which a brass drain cock is mounted to permit draining the radiator coolant. Previously mixed water and anti-freeze when poured in the radiator will go to the heater and prevent freezing, but when anti-freeze is added separately it will not circulate to the heater, and freezing of the water in the heater will result. This cock permits drainage of the water from the heater. The other opening has a bushing and a ⅜-in. nipple to which is fastened the hose leading to the upper rear of the motor block.

The 115-volt 750-watt element, of standard manufacture, is 10¾ in. long and has a ¾ in. diameter. Its ¾-in. pipe thread may be screwed into one end of the engine warmer jacket. A male coupling is brazed to one end of the unit to which an extension cord is coupled. This extension is brought to the front end of the truck and terminates in a specially selected connector or polarity plug, mounted in a ring welded behind the radiator guard.

All of these trucks are equipped with thermostats, which prevent the engine warmer from heating the entire capacity of the cooling system. These heaters keep the water or coolant in the motor block at a temperature from 50 to 70 degrees higher than air temperature.

Patent Rights
Number
1,680,923
1,716,872
1,746,670
1,799,269
1,831,153
2,190,748

Also Foreign Patents

WILSTA-FORM-EXTERNA

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1,586,991
1,667,253
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1,667,252
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2,048,151

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					Tensile Strength Ultimate	Maximum Allowable Working Load to Limit	
US-VL-1	⅜"	18"	(B-2) 3½"x5"	1,800 Lbs.	9,000 Lbs.	7,200 Lbs.	$1.86
US-VL-2	⅜"	24"	(B-2) 3½"x5"	1,800 Lbs.	9,000 Lbs.	7,200 Lbs.	2.07
US-VL-3	⅜"	30"	(B-2) 3½"x5"	1,800 Lbs.	9,000 Lbs.	7,200 Lbs.	2.25
US-VL-4	⅜"	36"	(B-2) 3½"x5"	1,800 Lbs.	9,000 Lbs.	7,200 Lbs.	2.40
US-VL-5	½"	20"	(B-3) 4"x5"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	2.33
US-VL-6	½"	20"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	2.48
US-VL-7	½"	24"	(B-3) 4"x5"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	2.48
US-VL-8	½"	24"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	2.63
US-VL-9	½"	30"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	2.93
US-VL-10	½"	36"	(B-4) 5"x6"	3,200 Lbs.	16,000 Lbs.	12,800 Lbs.	3.08

WM.'S VIBRA-LOCK CLAMP REMOVAL

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LENGTH of Rod	Price per 100 Rods	App. Wall Width	LENGTH of Rod	Price per 100 Rods	App. Wall Width
12" or less	$4.50	15" or less	12" or less	$6.00	15" or less
13"	4.88	16"	13"	6.50	16"
14"	5.25	17"	14"	7.01	17"
15"	5.63	18"	15"	7.50	18"
16"	6.00	19"	16"	8.00	19"
17"	6.38	20"	17"	8.51	20"
18"	6.75	21"	18"	9.00	21"
19"	7.13	22"	19"	9.50	22"
20"	7.50	23"	20"	10.01	23"
21"	7.88	24"	21"	10.50	24"
22"	8.25	25"	22"	11.00	25"
23"	8.63	26"	23"	11.51	26"
24"	9.00	27"	24"	12.00	27"

*Rods under 12" in length knurled to prevent turning in concrete.

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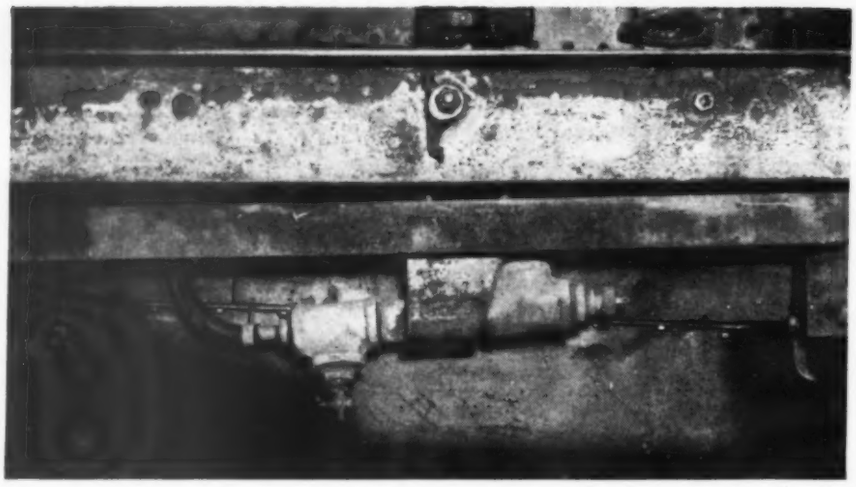
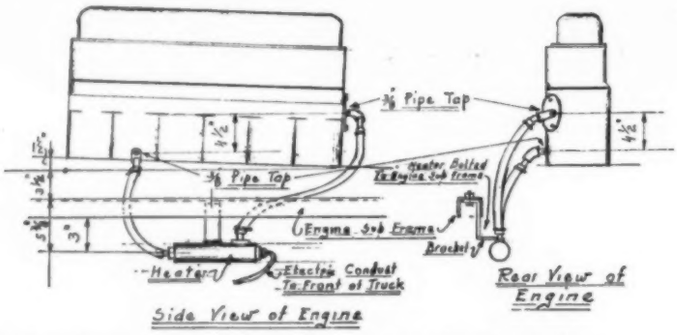


★ Close-up of a warmer unit, attached to underside of truck motor



★ Details of engine warmer as built in Chicago street department shop (drain cock not shown)

How Current Is Tapped

At the various parking locations electricity is brought to outlets installed in boxes atop poles set in the ground in orderly rows. Each pole has an outlet box from which two or four 3-wire extension cords are accessible. The rust-proof connector equipped with a turnlock and the screw-type lock ring completely weatherproofs the connection. The third wire in this hook-up is a ground wire which eliminates any possibility of shock in touching vehicles.

The operation of this equipment is

(*Continued on page* 116)

More Service Rigs

Arute Bros. on their 2½-million-dollar US 20 relocation job in upstate New York, last year, had equipment stretched out over twelve miles of grade. And we do mean stretched, as this outfit had bad weather for sure, and had to "move machines up and down the job all the time looking for places dry enough to work," as a local farmer aptly expressed it. 1,300,000 cu. yd. unclassified (10% rock). Mebbe fifty pieces of equipment.

To service and repair their trucks the contractors set up shop in a small-town garage along the job, and for heavy equipment and field spot repairs worked out with two "traveling garages" and two large grease-air trucks. The "garages" consisted of light dual-tired trucks with special enclosed metal bins (weatherproof and locked) for parts and tools—one for tractors and one for general service. Each truck had a small rear pick-up boom for use with a hand-operated chain hoist and a vise built onto a rear corner (see photo).

The grease trucks were Ford 1½-tonners, each with four Alemite grease lines and an air line for tires. Typical rigs, except for an elegant "refinement" or two, such as the convenient rear step. Roofed over, which is always a good idea; easy to drop canvas down in really bad weather.

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(*Continued from page* 114)

simple. The truck draws up to the curb and the driver opens the outlet box, removes the extension, and couples it to the male fitting on the truck.

At this writing three of Chicago's six truck parking locations are equipped with outlets for engine warming and about 90% of the trucks are equipped with engine warmers. The warmers are actually built into new trucks and are added to old trucks when their motors are overhauled.

Many Advantages

Fabrication and installation of heater units on trucks is not expensive. The major cost is that of erecting poles, transformer, and outlets at each parking location. Although there is no real substitute for indoor parking, the warmers are relatively inexpensive. Trucks equipped with them will start much more easily and consistently, and the wear and tear on cylinder walls and bearings will be much less than would be the case if the trucks were not supplied with engine heaters.

Engine warmers, of course, don't protect the transmission or hydraulic system from exposure to the cold. In the hydraulic system (tailgate, body, conveyor operation) the city uses hydraulic oil having a pour point of —10—20° F. A light grade extreme-pressure gear lubricant, SAE 90, is used for the differential and transmission. This lubricant having the same consistency as No. 50 engine oil is needed for the heavy duty equipment. Formerly SAE 140 was used in the summer, but now SAE 90 is used the year around. It has been found to be more economical and just as satisfactory.

Lloyd M. Johnson is commissioner of streets and electricity, city of Chicago.

Professional "Economists" Again Advise

(*Continued from page* 98)

To 43 "economists" who sponsor such an absurdity as that above quoted, I put this economic question: Have you ever figured the effect of a low "load-factor" on any costs of operation whatsoever? The load-factor for highway work is the ratio of actual hours worked annually to the total that could be worked if weather and other factors did not interfere. In America this load-factor is very low, and is one of the main causes of high costs of road building. But the lecturing economists advise making this low load-factor still lower.

Why didn't the 43 economists advise discontinuance of all railroad improvement until jobless days come abundantly again? Then the government could give money to the railroads for improvements and thus "prime the economic pump." There is no fundamental economic difference between the functions of highways whether by rail or by pavement. Neither should be the football of politicians nor of "economists" who are not economists.

American Road Builders Hold Winter Conference

(*Continued from page* 68)

ing, Nebr.; O. J. Porter, consulting engineer, Sacramento, Calif.; Jess E. Buchanan, president, University of Idaho, Moscow, Ida.

Directors: Maj. Gen. C. R. Moore, dir., Dept. of Aviation, Baltimore (one year); (to 1951): Wayne W. Parrish, editor and publisher, *American Aviation*, Washington, D. C.; Colonel Marcel Garsaud, Dade County Port Authority, Miami Springs, Fla.; Colonel Floyd E. Evans, Michigan Dept. of Aeronautics, Lansing; Wayne Parks, manager, Jefferson County Airport, Beaumont, Tex.; W. J. Bain, Colorado Div. of Aeronautics, Denver; Colonel Warren J. Carey, Los Angeles, Calif.; and J. P. Adams, Washington State Aeronautics Comm., Seattle.

Contractors' Division—Donald O. White, American Asphalt Paving Co., Chicago, re-elected president; Nello L. Teer, Jr., Nello L. Teer Co., Durham, N. C., re-elected-vice-president.

Directors-at-large (one year): H. E. Blakeley, Mississippi Highway Contractors' Assn., Joseph D. Bonness, president, Jos. D. Bonness, Inc., Milwaukee, Wis.; Wyatt B. Hodges, R. H. Wright & Son, Fort Lauderdale, Fla.; Rudolph Kraemer, Edward Kraemer & Sons, Plain, Wis.; Clyde O. Mitchell, contractor, Birmingham, Ala.; Edward Sloan of Sloan Const. Company, Greenville, S. C.; E. V. Williams, Williams Paving Company, Norfolk, Va.

Directors (to 1951): Frank Barber, Barber Brothers Co., Baton Rouge, La.; Frank H. Breslin, Breslin Construction Co., Louisville, Ky.; E. H. Hines, contractor, Greenwood, S. C.; H. C. Hoffheimer II, pres. Highway Contractors, Inc., Norfolk, Va.; S. J. Mahaffey, Virginia Road Builders' Assn., Richmond, Va.; Warren J. Mann, Carolina Road Builders' Assn., Raleigh, N. C.; A. E. O'Brien, exec. secretary, Associated Pennsylvania Constructors, Harrisburg, Pa.; and E. N. Rodgers, Alabama Road Builders' Assn.

County Division—Ben T. Collier, County engineer, Coahoma County, Clarksdale, Miss., was elected president to succeed W. Bruce Chilson, Chautauqua County, N. Y. Vice-presidents (re-elected): L. P. M. Gaylord, Supt. of highways, Lewis County, Lowville, N. Y., A. W. Hinderman, county engineer, Louisa County, Wapello, Iowa; J. A. McCurdy, counsel Association of County Commissioners of Georgia, Decatur, Ga.; and C. P. Fauerso, county roadmaster, Wasco County, The Dalles, Oregon.

Directors (1951): Walter C. Dye, Vermilion County, Ill.; A. F. Ranney, Summit County, Ohio; L. O. Fiscel, Pinal County, Ariz.; A. J. Thelen, Wis. County Boards Assn., Madison, Wis.; G. W. Koronski, Gogebic County, Mich.; J. Abramson, Police Jury of Caddo Parish, La.; T. H. Edwards, County Board of Revenue, Montgomery, Ala.

Municipal Division—J. B. Wilson, director of public works, Louisville, Ky., was elected president succeeding George M. Shepard, city engineer, St. Paul, Minn. Vice-presidents: H. F. Clemmer, engineer of materials and tests, Washington, D. C.; D. L. Erickson, director of parks, Lincoln, Nebr.; and W. N. Frickstad, superintendent of streets, Oakland, Calif.; W. E. Sheddan, city engineer, Jacksonville, Fla.

Directors (1951): H. E. Bush, city engineer, Plainfield, N. J.; C. W. Stump, Jr., superintendent of streets, Hagerstown, Md.; G. R. Blackburn, manager, Highway Department, Chamber of Commerce, Houston, Tex.; W. A. Coolidge, D. of P. W. and city engineer, Nashville, Tenn.; H. H. Kranz, city engineer, Cincinnati, Ohio; W. C. Clubb, city engineer, Eugene, Oregon; W. D. Beers, city engineer, Salt Lake City, Utah.

•

3,000,000 Cu. Yd. Concrete Job—It is expected bids will be asked this month for the construction of Hungry Horse dam and power plant, about 25 miles northeast of Kalispell, Mont. The dam is to be an arch-gravity concrete structure, 520 ft. high and 2,100 ft. long. The power house is to be reinforced concrete construction and will house four 75,000 kw generators. The work includes 1,265,000 cu. yd. excavation and 3,000,000 cu. yd. concrete.

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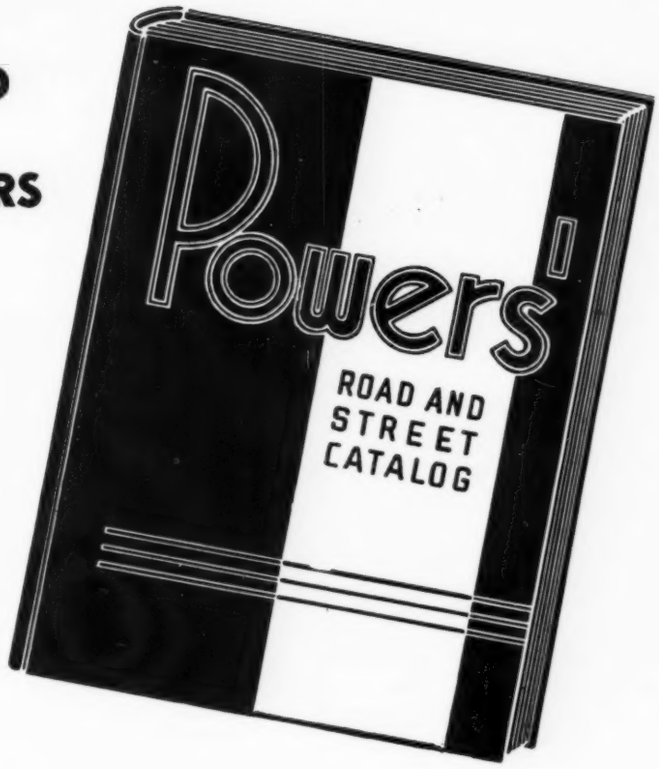

"Catalog is always within reaching distance. Wouldn't be without it!"

A State Highway Engineer made this comment, but practically the same thing has been said by County, City and Federal Engineers; Road and Street Contractors, and Airport Engineers and Managers.

Comments come pouring in from every part of the field in praise of the Catalog and asking to be kept on the list to receive the next edition.

Requests come from the men who plan and design, construct and maintain the roads and streets of the Nation. They are the State, Federal, City and County Engineers; Chairmen of County Boards; Directors of Public Works; Engineers of National Parks and Forests; and Airport Managers and Engineers. They are the Highway and Heavy Construction Contractors who furnish the major market for the purchase of road building equipment and materials.

POWERS' ROAD AND STREET CATALOG offers the most economical and satisfactory method of placing your Catalog information where it will be constantly available to the man "who wants what he wants when he wants it." Here in one compact reference book is all the necessary information on all types of equipment and materials, indexed for easy reference, with names and addresses of nearest equipment dealers.

It is estimated that expenditures for maintenance alone this year will reach the billion dollar mark. To this will be added another billion for new construction and improvements. Step up your advertising for increased buying tempo in this huge market for road building and maintenance equipment and supplies.

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Write for booklet "What Users and Buyers Want to Know About Care and Maintenance of Equipment."

Gillette PUBLISHING COMPANY
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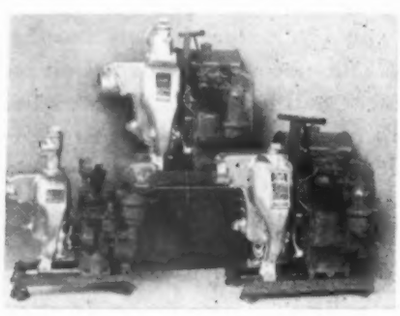
New Construction Equipment and Materials

1

New Lightweight Pumps

Faster automatic priming, resulting from the perfection of a new priming principle, is one of four major improvements in the new line of lightweight, centrifugal, self-priming pumps of The Gorman-Rupp Co., Mansfield, O. Priming at higher suction lifts, higher pressures and capacities, and all 'round higher efficiencies also are stated to result from the application of this new priming principle to the Gorman-Rupp Midget, Hawk and Eagle lightweight pumps illustrated left to right. Statistics on these pumps follow: The Midget 1½ in. pump; powered by either a Lawson or a Briggs & Stratton 1½ hp single



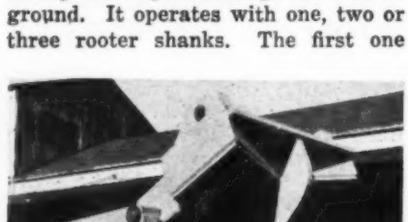
Gorman-Rupp Pumps (Left to Right): The Midget, The Hawk, The Eagle.

cylinder, 4-cycle air cooled engine; maximum capacity, 86 GPM at 30 ft. head; maximum lift, 30 ft; priming time, 1 minute 15 seconds at 25 ft. suction, lift; weight, 62 lb. The Hawk 2 in. pump; powered by a 2.8 hp Wisconsin Model AB single cylinder, 4-cycle air cooled engine; maximum lift, 30 ft.; priming time, 47 seconds at 25 ft. suction lift; maximum capacity, 156 GPM at 30 ft. head; weight, 110 lb. The Eagle 3 in. pump; powered by a Wilson 5 hp single cylinder, 4-cycle air cooled engine; maximum capacity, 280 GPM at a 30 ft. head; maximum lift, 30 ft.; priming time, 1 minute 19 seconds at 25 ft. suction lift; weight, 117 lb.

2

New 17-Ton Ripper

A new 17-ton custom built ripper, announced by Soulé Equipment Co., Oakland, Calif., is stated to be strong enough to take the pull of three or four 104 to 150 h.p. tractors, and to be capable of penetrating 6 ft. of hard ground. It operates with one, two or three rooter shanks. The first one



Giant Ripper, Model R-2

built has been sent to Saudi, Arabia for pipe line ditching operations. Soulé recommends the ripper for deep-penetration ground breaking ahead of ditchers on pipe line or cable laying jobs. It also may be used to reduce the need for blasting on excavating operations. Overall width is 13′ 5″, over all length 25′ 7″; rooter shank is 10 ft. 4½ in. x 18 in. x 5 in.

3

New Crane

The Lugger Crane, a versatile and mobile hydraulic unit, announced by Day-Smith Hydraulic Crane Corporation, Camp Hill, Pa. The crane lifts and carries up to 6,000 lb. Ten feet of vertical boom travel is provided, with a corresponding cable travel of 16 ft. Maximum clearance under hook is 18 ft., 6 in. Sidewise movement of the boom is limited to assure stability when handling maximum loads, even with unskilled operation. All movements of the crane are readily controlled by one man from the driver's seat through a simple-system of precision Daybrook hydraulics.

Mail Inserted Card

For data on equipment described on these pages. See also inquiry blank on page 133.

4

New Finishing Machine

A diagonal screed finishing machine is being offered by The Jaeger Machine Co., Columbus, O., after 18 months of test use on highway work in New York, Ohio, Missouri, California and other states. It is equipped with a transverse front screed and a pivoted rear screed which the operator can swing diagonally in either direction to operate at whatever angle best suits the work. Advantages claimed for the machine include the following: When finishing super-elevated curves and any slab

Type "X" Diagonal Screed Finisher

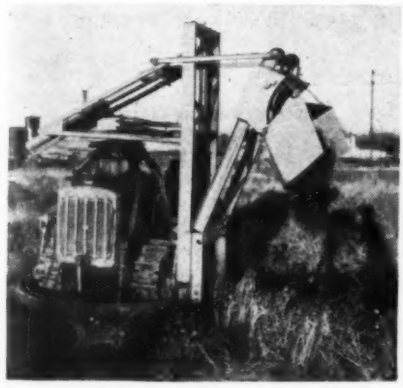
with a drainage pitch, the angle of the rear screed causes it to carry the desired amount of material uphill and compact it solidly against the higher form. The steeper the pitch, the greater the angle at which the screed is operated. Gradual adjustments of the screed angle are made without

stopping as the machine approaches and leaves super-elevated curves. Another important gain is in the accuracy of surface, resulting from the fact that the rear screed, operating diagonally to the front screed, always meets the material at a different point, removing high spots with a slicing action and troweling material into low spots. A further advantage claimed for diagonal screeding is the ability to finish harsh dry mixes faster without tearing because of the fact that the rear screed works at an angle against the material left by the front screed. Both screeds are of quick-crown-change type, enabling the operator to adjust crown or flatten either screed with the turn of one lever as it approaches finishes and leaves super-elevated curves. Quick adjustment of the front screed, to increase or reduce the amount of material supplied to the rear screed, is made in the same way. Vibratory equipment and tamper and belting attachments can also be furnished.

5

New Tractor Loader

A new loader manufactured by Decker Bros., Inc., Denver, Colo., has a bucket that swings 180 degrees on a circular track thus permitting loading one truck while a second truck is taking position on the other side. Power is obtained from the crawler tractor



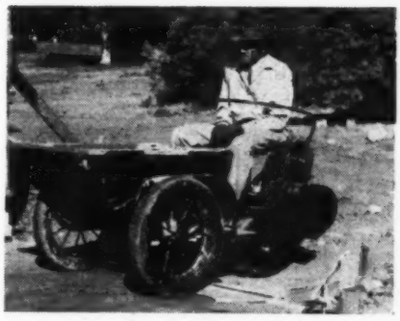
Decker "Swing-Around" Loader

engine and applied through a simple hydraulic system. Controls are positive-acting and located within easy reach of the operator. The loader will be produced to fit several of the most popular models of crawler tractors, buckets ranging from 1 to 2½ cu. yd. in size. The loader permits one man operation. It is versatile and easily mounted and demounted from tractor. The manufacturer is now ready to grant sales franchise to distributors throughout the United States and the world.

6

New Motorized Wheelbarrow

A new motorized wheelbarrow, announced by Gar-Bro Manufacturing Co., Los Angeles, Calif., weighs 600 lb. and is capable of carrying a load of 1,500 lb. It is 81½ in. long and the loading height is 31 in. A unique feature is the tiller, which not only controls the front and reverse gear,



Gar-Bro "Power-Cart"

but also acts as a steering mechanism—one lever only for steering and direct control. The power unit is 2½ h.p. (minimum) air-cooled gasoline engine with V-belt and chain drive. It is detachable from cart by four bolts. Turning radius 4 ft.; speed is 6 to 8 m.p.h. Cart wheel is 4.00 x 18, 4-ply pneumatic tired. Driving wheel is 16 x 4.00—0 pressure.

7

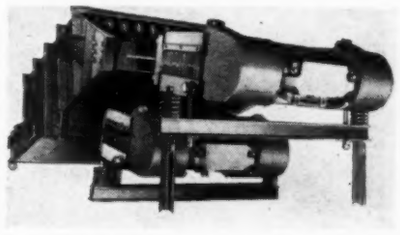
New Heavy Duty Hauling Unit

A new heavy duty electrically powered hauling unit, the Tournahauler, introduced by R. G. Le Tourneau, and marketed by his Tournalayer Sales Division, Longview, Tex., is stated to have the power and traction to negotiate almost any type of rough going, with loaded capacities ranging from 20 to 100 tons. Positive steering power for the unit is controlled by means of small micro-switches on the dash board. The operator may, with a single flip of his finger, guide the rig in any desired direction. The two-wheeled prime mover is diesel-powered with electric starter. It is equipped with multiple disc air-actuated brakes. A No. 2, 50 KVA, in-line generator, driven off the engine, supplies current to an electric motor, operating a gear on the yoke king pin, which steers the prime mover and trailer as a locked integral unit. Unusual design permits 90 degree turns. For certain phases of operation, overhead trollies, winches or jib cranes with electrically-powered cable hoists may be installed at the factory. These adaptations are also powered from the same generator which operates the steering mechanism.

8

New Vibratory Grizzly Feeder

Specially designed for the large capacity separation of crusher feeds the F-55 double magnet, heavy duty electric vibratory grizzly feeder illustrated is the latest addition to the line



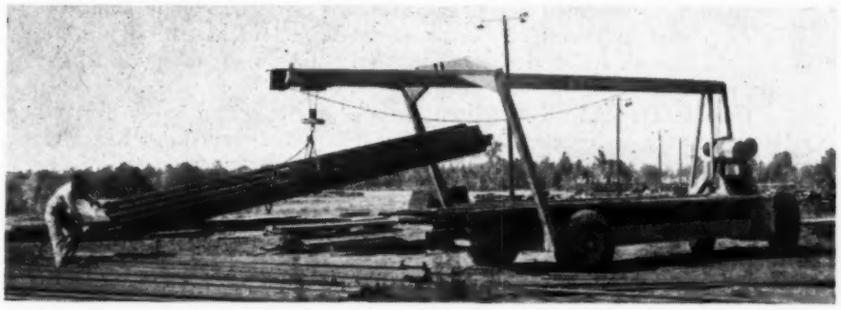
Model F-55 Vibratory Grizzly Feeder

of vibratory grizzly feeders of Syntron Co., Homer City, Pa. These grizzlies are available in different sizes and styles, either single or double magnet, with the magnets mounted above the deck or below, all featuring the variable control of the rate of feed and with either full or partial grizzly decks.

9

New Angledozer

A new angledozer brought out by Contractors Machinery Co., Inc., Batavia, N. Y., has seven blade posi-



Tournahauler Self-Loading Pipe

tions. This new addition to wheel-type tractors, besides the regular bulldozing position, features six other angles —three on each side. All are quickly adjustable, and are stated to permit the operator to have exactly the right angle for every material handling job. Blade is held firm and rigid in all seven positions by a patented parallel lift mechanism. The unit is simple to operate, requiring no skill, has full axle clearance and leaves the tractor free for pulling rollers, scrapers and similar equipment. Its mechanical float position is designed to overcome four-way valve difficulties, and to insure flexible and smooth operation. Manufactured in three sizes, the angledozer is currently available for International I-4, I-6, ID-6, I-9 and ID-9 tractors.

10

New Wagon Drill

A new, light-weight wagon drill has been announced by Ingersoll-Rand Co., New York, N. Y. Known as the Wagonjack, the machine is stated to combine the drilling stability of a wagon drill with the portability of a Jackhamer. Light-weight construction, centralized controls, and ball bearing, pneumatic-tired wheels allow the machine to be transported, set up, and operated by only one man. Capable of mounting either the J-50 Jackhamer or the DA-30 drifter, the Wagonjack features a chain feed which is driven by a van-type air motor. Adjustable anchors permit

Wagonjack

taking up slack in the chain. A self-locking worm gear prevents the drill from jumping forward when a soft spot is encountered. Stop bolts equipped with buffer springs prevent over-travel of the drill at the back end of the tower, and the steel-centralizer bracket performs the same function at the front end. Control handles for both the drill and the air motor are grouped on the air motor mounting, which may be raised or lowered on the tower to suit the operator.

11

Patrol Grader

Several new features have been introduced in its 1948 Trojan road patrol by the Contractors Machinery Co., Inc., Batavia, N. Y. These include redesigned front and rear axles providing added strength, greater

Model PM-10-48 Trojan Patrol

clearance, increased flotation and better traction. The unit has center control for easy steering, and Parker aircraft type hydraulic fittings. The unit weighs 10,500 lb. Extras include scarifier, bulldozer, V type snow plow and cab or canopy. Leaning front wheels are available as a factory installed extra.

H&B Moto-Paver

THE COMPLETE TRAVELING MIXER AND PAVER

The Moto-Paver is especially adapted for resurfacing work on secondary roads and city streets, and is also highly efficient on new construction. Contractors who have seen it operate pronounce it "the first improvement in 20 years for doing mixed-in-place work."

The aggregate may be dumped directly from trucks into the front hopper (as shown at the right) or, if desired, it may be picked up from a windrow, using the H & B Moto Loader.

MOTO-PAVER DOES THE MIXING AND LAYING JOB IN ONE CONTINUOUS OPERATION

The MOTO-PAVER does the *complete* mixing and laying job. The mixed material is delivered, spread and struck off on the road surface, ready for rolling. The strike-off blade is adjustable to hold accurately to specified grade and crown. The strike-off mechanism is supported independently on runners 25 feet in length. This insures a smooth finished surface without waves, even when resurfacing rough or irregular pavement.

The MOTO-PAVER has been successfully operated using gravel, stone or slag aggregates, and with most types of emulsions, RC, MC AND SC asphalts and tars.

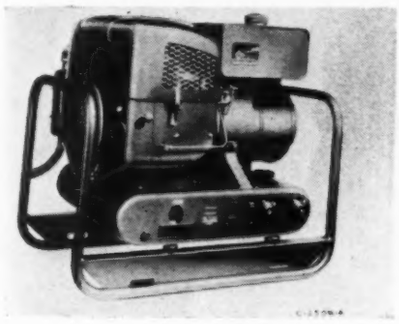
Bulletin MP-47, giving complete information and specifications, will be sent on request.

HETHERINGTON & BERNER INC.
721 Kentucky Avenue • Indianapolis 7, Ind.

12

New Welder

A new portable engine-driven D.C. welder that operates independently of highline power has been announced by D. W. Onan & Sons Inc., Minneapolis, Minn. It is rated at 150 amperes, 30 volts. Fundamentally simple in design, the new Onan D. C. welder is unusually compact. Including frame, it is 31¼ in. long, 23⅜ in. wide and 24¼ in. high. Built-in dual current controls are standard equipment. The main current tap switch has eight settings ranging from 45 to 180 amperes; and the fine current



New Onan Welder

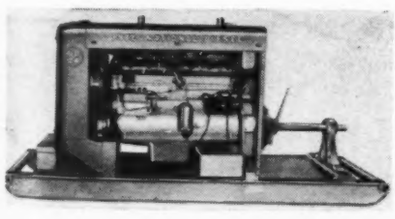
control permits complete latitude between main tap settings. These two controls allow the operator to select the exact welding heat for perfect welds on any metal.

This welder is available in two models. The Onan Model 5CK-332M9, equipped with a sturdy tubular guard-and-carrying frame, can be easily carried by two men. Model 5CK-332M is designed for stationary applications; and, when mounted on a specially designed Onan two-wheeled dolly, it can be moved to any job location by one man.

13

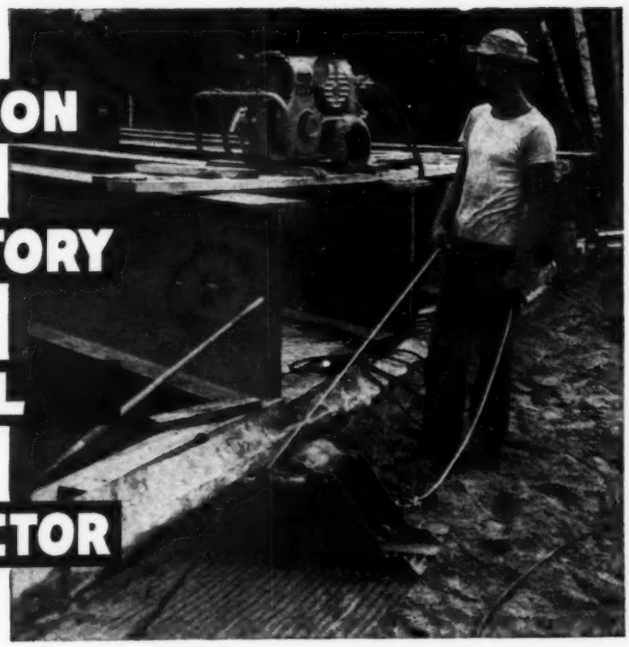
New Heavy Duty Diesel Engine

A new 6-cylinder 1090 cu. in. displacement diesel engine with a 5¾"x 7" bore and stroke, the UD-24, is now in production by International Harvester Co., Chicago, Ill. The UD-24 engine develops 191 hp. at 1375 r.p.m. while the UD-24 power unit, equipped with radiator, fan, clutch,



International UD-24 Power Unit

The **JACKSON VIBRATORY SOIL COMPACTOR**



"Pre-Settles"* BRIDGE APPROACHES SIMILAR FILLS *Firmly Compacts Sub-bases of Factory Concrete Floors

This remarkable new machine will give you up to 95% of MAXIMUM DENSITY (in granular soils) IN A SINGLE PASS — and do it in less than one-fifth of the time the job may be attempted with other equipment! Eliminates long delays in paving and paving settlement; assures solid sub-base for factory concrete floors on which heavy machinery is to be mounted.

Note these features: 1. PROPELS ITSELF AT 6' to 8' PER MINUTE . . . under normal conditions. Operator has nothing to lift or drop; he simply guides it. 2. FIRMLY COMPACTS 15 sq. ft. to 18 sq. ft. PER MINUTE TO A DEPTH OF 12 INCHES!

3. WEIGHS ONLY 150 LBS. Two men can easily throw it on a truck or carry it to nearby locations.

4. TIME-TESTED VIBRATORY MOTOR — used on our standard equipment for 25 years. Operates on 3-phase, 110 volt, 60 cycle AC.

THE MODEL M-2 PORTABLE POWER PLANT (see photo) usually furnished to operate Jackson Soil Compactors generates both single-phase and 3-phase 110 volt, 60 cycle AC. May be used for lights and power tools as well as running the Compactors. Will operate 4 Compactors simultaneously. JACKSON Power Plants are known throughout the nation for their outstanding reliability.

It's the ideal soil compactor for those areas inaccessible to the large tractor drawn equipment. With a change of bases, it is also highly effective on coarse gravel and rock, and for smoothing and compacting blacktop. What "pre-shrinking" is to the cotton shirt, vibrating with the Jackson Compactor is to bridge approaches and similar fills. Write, NOW, for the complete facts!

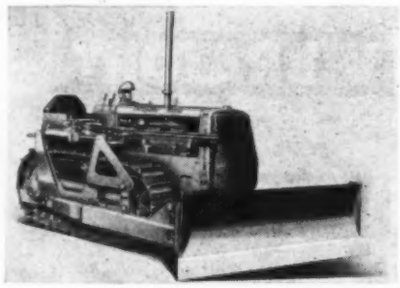
ELECTRIC TAMPER & EQUIPMENT CO., Ludington, Mich.

and power take-off, develops 180 hp. at 1375 r.p.m. Features of the engine include: 4-cycle design which contributes to simplicity of engine operation and maintenance; new International twin-plunger fuel injection pump, especially designed to give smooth engine operation, good governed speed regulation, superior lugging ability, and minimum fuel consumption; IH pre-combustion chamber which makes possible efficient use of low cost fuels such as No. 3 fuel oil; location of exhaust and intake manifolds on opposite sides of the engine to assure maximum power and long valve and piston life by providing free flow of cool air into the engine and free flow of exhaust gases from the engine.

14

New Angling Type Bulldozer

The "Caterpillar" No. 4A, angling type, hydraulic controlled bulldozer, designed for exclusive use with the "Caterpillar" Diesel D4 track-type tractor, has been placed in production by Caterpillar Tractor Co., Peoria, Ill. Supplementing the recently introduced No. 4S, straight type, hydraulic controlled bulldozer, the new tool gives increased earth-moving characteristics to the D4 tractor by providing either straight or angling type blades in the range of operations to which a tractor of



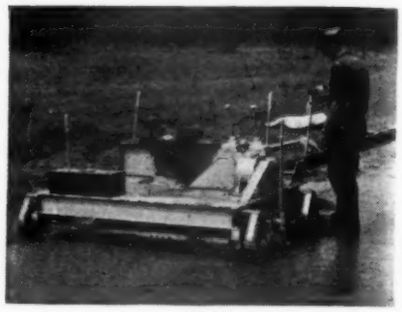
4A Angling Type Bulldozer

this size is applicable. The No. 4A incorporates the advantages of the "Caterpillar" hydraulic system and the accepted blade qualities of the manufacturer's hydraulic and cable controlled bulldozers. The No. 4A is offered with an 88-in. blade for the 44-in. gauge D4 and 108-in. blade for the 60-in. gauge tractor. The blade has a 31 in. lift above the ground with the blade straight while, with the blade angled but not tilted, the front point will lift 37½ in. with the smaller gauge and 38½ in. with the wider gauge. The maximum blade pitch adjustment is 25 degrees and the maximum tilting adjustment is 6 in. The complete bulldozer assembly consists of the blade, C-frame, trunnions, hydraulic mechanism and heavy-duty radiator guard which protects the front-mounted hydraulic pump.

15

Improved Widening Finisher

An improved model of its widening finishes has been announced by Blaw-Knox Co., Pittsburgh, Pa. Feature of the improved model is a unit automotive type transmission with all



Improved Widening Finisher in Use on Route 66, Pennsylvania

BIGGER PAYLOADS
with WELLMAN
Williams Type BUCKETS
• Exclusive features in design and construction make payloads bigger... at lower cost! Weight is balanced, not cumbersome. Extra strength is built into every part with the sturdy welded rolled steel construction pioneered by Wellman, the leader for over fifty years. A type for every service!
THE WELLMAN ENGINEERING COMPANY
7003 CENTRAL AVENUE • CLEVELAND 4, OHIO
SEND FOR BULLETIN

Economical Versatility

Easy-handling MM Industrial Tractors have balanced weight and power, a wide range of speeds and front or rear power take-off for the efficient handling of a wide variety of attachments. Low operational and maintenance cost and easy accessibility for servicing recommends MM for use with: pull-behind and side-mounted mowers, V-type and reversible plows, bulldozers, rotary brooms, flushers, bucket or fork loaders, winches and cranes.

The MM 27 H.P. RTI and 49 H.P. UTI Industrial Tractors are BUILT TO DO THE WORK *conveniently, safely, economically.*

See Your MM Dealer Distributor or Write

MINNEAPOLIS-MOLINE MM MODERN MACHINERY

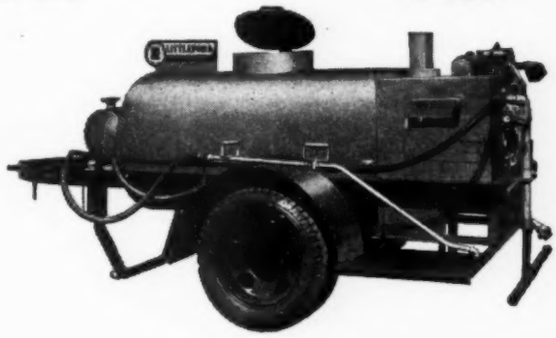
MINNEAPOLIS-MOLINE
POWER IMPLEMENT COMPANY
MINNEAPOLIS 1, MINNESOTA

THREE ROAD MAINTENANCE JOBS WITH ONE UNIT

1 *Crack Filling*—there's a Pouring Pot Outlet on the No. 101 Utility Spray Tank for this kind of work, no need to have special equipment for this type of maintenance, when you get it as part of this *utility* unit.

2 *Hand Spraying*—for Road, Street or Highway patch work, the No. 101 Utility Spray Tank has a Hand Spraying Attachment. Only one man is needed to operate this attachment. It's the second job available with this *Utility* unit.

3 *Small Application Spraying*—Spray Bar up to 10 feet in width can be used for spraying small maintenance jobs, shoulder widening work, seal coating, etc. Here's the third job you can do with this No. 101 Utility Spray Tank.



Utility is the word for it. Three jobs in Road, Street or Highway maintenance done with one unit—the Littleford No. 101 Utility Spray Tank. Why purchase a separate unit to do each job, when all three jobs can be done with one? Here is a packaged piece of equipment containing *utility*; made in sizes from 400 to 1000 gallons. Get more details by writing for Bulletin No. 5.

MANUFACTURERS OF

"Tankar" Steam Heaters
"Kwik-Melter" Roofers Kettles
Trail-O-Rollers
"Spray Master" Pressure Distributors
Highway Brooms
Tool Heaters
Trail-O-Distributors
Asphalt Supply Tanks
No. 101 Utility Spray Tanks
84-HD Asphalt Kettles

LB LITTLEFORD
BLACK TOP ROAD MAINTENANCE EQUIPMENT SINCE 1900

LITTLEFORD BROS., INC.
454 E. Pearl St., Cincinnati 2, Ohio

parts running in oil. An oversize ball bearing clutch and a simplified shoe type steering device have been added as standard equipment. The Blaw-Knox widening finisher is of the single screed type with widths adjustable from 2 to 6 ft. by changing the screed wings. The machine has one forward traction speed suitable for all normal work and one high reverse speed. It has two screed speeds to accommodate concrete of different textures.

16
New Truck Loader

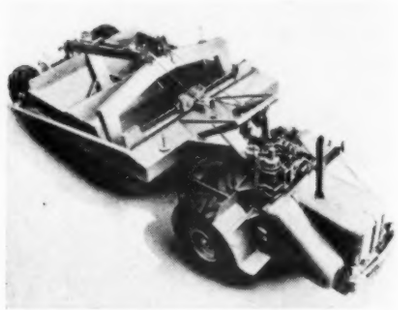
A revolutionary new truck loading device, featuring one-man, speedy operation, announced by The Shoveller Corporation, Portland, Me., operates entirely without any power take-off from the truck. The traction of the truck's rear wheels on the Loader's treads operates a lever mechanism which raises the bucket to the dumping position. The only equipment needed on a truck is the hitch. This can be installed in approximately eight hours and any number of trucks, with the hitch installed, may be used with the same Loader. It is stated that a 3-yd. truck body can be loaded in 3 minutes. The method of operation is such that the truck driver controls the entire process without leaving his cab and without any assistance. The driver backs his

S-C Truck Loader in Action

truck, which has been equipped with a hitch, into the truck-loader, loads his truck, and pulls a lever in his cab to release the catch and drives away. As optional equipment, the ¼-yd. bucket, which is used for sand, gravel, crushed rock, etc., may be replaced in 10 minutes by a ¾-yd. bucket for use in snow removal. This new equipment has been given exhaustive "on-the-job" tests by contractors, state highway commissions and individual operators.

17
New 200 HP. Scraper

A new 200 h.p. Terra-Cobra high-speed self-propelled earthmover (Model TC-S14) has been developed by Woolridge Manufacturing Co., Sunnyvale, Calif. The new Terra-Cobra incorporates a larger clutch and heavier duty transmission to deliver maximum power on the drive wheels. A large 17 in. clutch of single plate dry disk non-adjustable



Model TC-S14 Terra-Cobra Earthmover

type automatically compensates for facing wear. High-capacity constant-mesh helical gears in the transmission insure faster shifting and smoother performance. Designed for fast travel on long or short hauls, the new

FOR LATE WINTER SNOWS

Immediate delivery on **GLEDHILL** *snow plows!*

Insert shows Gledhill standard, one-way 10′ plow, spring-type flareboard—

- **Gives additional height**
- **Provides better vision**
- **Keeps snow rolling**

Write for prices and name of your nearest distributor.

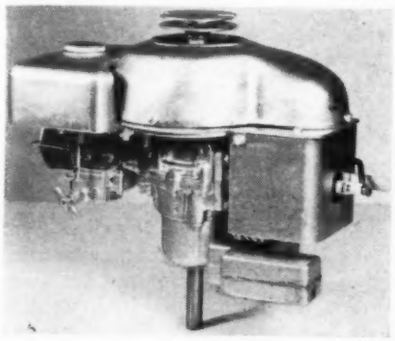
GLEDHILL ROAD MACHINERY CO., Galion, Ohio

Terra-Cobra has four forward speeds ranging up to 17 m.p.h. fully loaded and one speed reverse. The scraper bowl has a heaped capacity of 17.5 cu. yd.; 14.0 yds. struck. Heavy duty air brakes actuate simultaneously on rear wheels of scraper, assuring full and complete control of the Terra-Cobra at all times. Split-second control of cutting blade, apron and positive tilt forced load ejector is provided by means of a powerful air-operated cable hoist which maintains constant and uniform pressure on cables at all times.

18

New 1 HP Engine

A vertical shaft gasoline engine, now under production by Power Products Corporation, Grafton, Wis., is 8½" x 10½" x 14" in size, weighs only 16 lb., and develops a full horsepower. Use of the 2-stroke principle



New 1 HP Engine

and the new light-weight metals, and with special attention given to carburetion and magneto, has enabled the designers to eliminate all unnecessary weight and still produce a sturdy smooth running engine, easy starting, minimum noise and vibration and good operation at any tilt up to 45°.

MANUFACTURERS' LITERATURE

19

Crane

A 20-page illustrated catalog issued by Wayne Crane Division, American Steel Dredge Co., Inc., Fort Wayne, Ind., describes its one-man operated, rubber-tired machine serving as a 5-ton crane, ½-yd. clamshell, ½-yd. dragline, ½-yd. power shovel or ½-yd. trench hoe. Two booms and attachments are interchangeable. Book gives complete operating and specification data.

20

Weatherproofing Exposed Metal

A new, 12-page, illustrated bulletin describing a recent development for protecting out-door structures against weathering has just been issued by the Arco Co. of Cleveland, O., and Los Angeles, Calif. The booklet tells how the company's new "Dum Dum for Metal" provides a tough but elastic and pliable weather-resistant, water-repellent coating for use on both new or uncoated metal structures.

21

New "Sound-Sight" Traffic Marker

A new type traffic marker or lane separator as installed on a New Jersey Highway is illustrated and described in a brochure issued by Universal Atlas Cement Co., New York, N. Y. The marker has a 1 in. topping of scored white mortar made with light-colored sand and Atlas White portland cement. It was developed as a result of a test installation with gray cement on an adjacent section of the same road six

CONCRETE *Cured* IN 72 HOURS

Fulco COTTON *Concrete-Curing* MATS

Best-By-Test

For a dependable job that will stand up for a uniform cure, that reduces possibility of cracks, Fulco Cotton Mats are days quicker and much cheaper than any other curing method. Fulco is favored and approved for State and Federal highway construction.

Fulco MATS USABLE 50 TO 75 TIMES!

Durably made of tough osnaburg, stitched edges and running seams 4" apart, a Fulco Mat can be used over and over again — 50 to 75 times. Fulco Mats, filled with padding weighing 12 oz. per sq. yd., keep dripping wet longer with less water and are more efficient in insulating against temperature changes. Fulco Mats give you extra savings in cities where earth must be hauled in and out. *And* — the compressive strength of concrete cured by Fulton Mats is greater than that cured by any other method.

WRITE FOR SPECIFICATION AND PRICE LIST

Address Nearest Factory Branch

FULTON BAG & COTTON MILLS

Manufacturers Since 1870

New Orleans · Denver · St. Louis · Atlanta · Dallas · Minneapolis · Kansas City, Kans. · New York

FOR ALL DIG-AND-HAUL WORK!

Sauerman Cableway pictured above is digging gravel from bar in river and hauling to top of screening plant in one operation. Handles 700 cu. yd. a day at cost of few cents a yard.

CUT TIME IN HALF with Sauerman

This picture shows a small Sauerman Scraper handling large stockpile of sand at processing plant. Scraper stocks out material from washery and reclaims at regular intervals from stockpile to dryer.

Long Range Material Handling Machines

Write for catalog and describe your handling problems.

Digging, hauling and dumping operations are combined in one continuous process making possible big savings in both time and labor. Only one man is required for complete control of the operation. Sauerman Cableway and Scraper Machines provide wide range of handling capacities and long reach. Remarkably low operating and maintenance costs. They dig in any kind of dry ground or under water. Gasoline, electric or Diesel.

SAUERMAN BROS., Inc.

588 S. CLINTON STREET
CHICAGO 7, ILLINOIS

KINNEY

BITUMINOUS DISTRIBUTORS

DEPENDABLE • LONG-LIVED

Dependability is built into Kinney Distributors . . . in every detail they are engineered for trouble-free performance. Their long-lived Kinney Rotating Plunger Pump has no valves, springs or gaskets and only one stuffing box. Heated by engine exhaust, it applies all grades of bitumen up to 400 g.p.m. in the exact quantity specified. A simple three-way valve controls loading, circulating and spraying — provides instant starting: Compressed air automatically cleans nozzles as spray bar is closed. For years Kinney Bituminous Distributors have been famous throughout the world for reliable operation and low maintenance.

Write for Bulletin

KINNEY MANUFACTURING COMPANY

3537 Washington St., Boston 30, Mass.

We also manufacture Vacuum Pumps, Liquid Pumps and Clutches.

years ago. It is both audible and visible. The driver can hear it as well as see it.

22

Jaw Crushers

Bulletin 1100 on their Grizzly King jaw crushers has been issued by Lippmann Engineering Works, Milwaukee, Wis. It contains sales and engineering information including weights, dimensions and capacities.

23

Electric Welding Cable Connections

A new 12-page bulletin describing the complete line of Tweco welding electrode holders, ground clamps, cable connectors, machine terminals, cable splicers, lugs and carbon holders has been issued by Tweco Products Co., Wichita, Kan. Quantity price and parts information is included.

24

New Electrode Wall Chart

A 25" x 35" electrode wall chart published by The Hobart Brothers Co., Troy, O., shows procedures for every type of arc welding electrode; actual results of too long or too short an arc, too much or too little welding heat, too fast or too slow a welding speed, and then shows a perfect bead as well as a cross section of all welds; and complete illustrated welding symbols for both fusion and resistance welding.

25

New Wire Rope Sling

The "Hercules" (Red-Strand) flat-laced wire rope sling added recently to the line of A. Leschen & Sons Rope Co., St. Louis, Mo., is fully illustrated and described in a bulletin of the above company. This sling consists of a flat body made with six parts of "Hercules" (Red-Strand) wire rope laced, together—not braided—in a manner that eliminates placing the parts in shear under the pressure of a load. This construction of the body section produces a flat and flexible support twice as wide as its thickness. Because of its flat, belt-like surface, load pressure is distributed over a greater area than with a round bodied sling, resulting, it is stated, in less wear to the sling and less marking of highly finished surfaces on the load. The loops on the ends are designed to be self-supporting without the use of thimbles or servings.

26
Batching Plants

Advantages and condensed specifications of Noble batching plants are described in four illustrated four-page folders just released by Noble Co., Oakland, Calif. A separate folder is devoted to each of four plant sizes: 80, 100, 150, and 350 tons. Plan drawings and photographs of field installations are included for each model.

27
Packaged A-C Generators

"How to apply 'Packaged' A-C Generators", is described in the 16 page Synchronizer Vol. 8, No. 3a, published by Electric Machinery Mfg. Co., Minneapolis, Minn. Seven handy tables for generator and wire selection are included in the article.

28
Protective Coating

Pamphlets on its product Sika Seal, a protective coating of unique properties, have been issued by Sika Chemical Corporation, Passaic, N. J. Sika Seal is not an emulsion. Tests listed in the pamphlet show the excellent protection Sika Seal gives to concrete, mortar, wood, steel or other metal or non-metal surfaces. Two separate pamphlets are available—one particularly for architects and engineers and one for contractors and maintenance engineers. Sika Chemical Corporation also has available an attractive pamphlet that presents, in condensed form, solutions to various problems encountered in new construction and maintenance work.

WITH THE MANUFACTURERS & DISTRIBUTORS

Joins Euclid

R. E. Keidel has joined the Advertising Department of The Euclid Road Machinery Co., Cleveland, O., as assistant advertising manager. Since his discharge from the Army Air Corp., Mr. Keidel has been engaged in industrial advertising and prior to joining Euclid was assistant advertising manager of the Tremco Manufacturing Co.

A ROGERS 'Tagalong' Trailer AND YOUR DUMP TRUCK

...form a PROFIT-PRODUCING TEAM

Contractors everywhere are turning to the Rogers "Tagalong" for a bigger day's work with maximum economy.

One man can do all jobs. Load and unload trailer, connect and disconnect it; drive truck and operate equipment carried.

Ideal for light and medium shovels, cranes, bulldozers, etc.

Write for complete information.

Showing cable around sheave and dump body about to be raised to engage towing tongue.

Body elevated. Tightened cable has raised drawbar and engaged towing tongue. Safety coupling pin is inserted. Trailer is ready to roll when body is lowered.

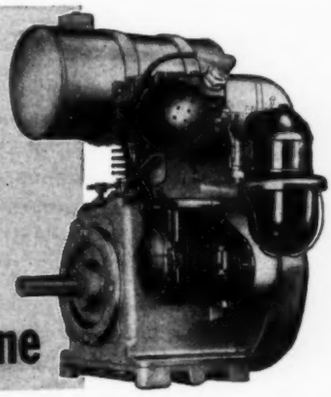
ROGERS HEAVY DUTY Gooseneck Trailers

ROGERS BROTHERS CORPORATION

DESIGNERS and BUILDERS of HEAVY DUTY TRAILERS SINCE 1915

110 ORCHARD ST. ALBION, PENNA.

You Get HEAVY-DUTY SERVICEABILITY in a Small Engine WHEN YOU SPECIFY WISCONSIN Air-Cooled Engine



In designing power-operated equipment within a 2 to 4 hp. range . . . one of the vitally important considerations is to secure a power unit that can be depended upon for *heavy-duty serviceability*.

This is one of the predominant characteristics of the little Models AB and AK Wisconsin Air-Cooled Engines. Every detail of design and construction . . . from the Timken tapered roller bearing mounting of the crankshaft front and rear, to the mirror-honed cylinder . . . has been engineered for heavy-duty operation under rugged conditions. These engines are equipped with rotary type outside magneto impulse coupling, assuring quick, easy starting in any weather, at any season.

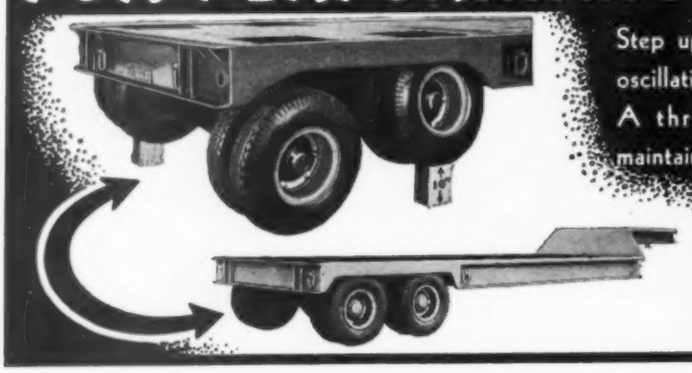
Write for detailed specifications and other pertinent data. Wisconsin Air-Cooled Engines are available in 4-cycle single cylinder and V-type 4-cylinder models in a complete power range.

WISCONSIN MOTOR Corporation

MILWAUKEE 14, WISCONSIN

World's Largest Builders of Heavy Duty Air-Cooled Engines

FOR PERFORMANCE-CHECK THIS!



Step up or step down with the La Crosse "field leading" oscillating tandem axle - capable of 10 inches of oscillation. A through H-beam axle which, alone, will permit and maintain perfect wheel alignment.

COMPARE THE COST - THEN - BUY LA CROSSE

Dealers In 48 States

HEAVY DUTY LA CROSSE TRAILER CORPORATION LA CROSSE, WISCONSIN

New Richkraft Distributor

Potts-Farrington Company, 1224 Cherry Street, Philadelphia, Pa., has been named Richkraft distributor for the states of: Eastern Pennsylvania, South-Central New Jersey, Delaware, Virginia and the Eastern Shore of Maryland.

Potts-Farrington Company will handle the complete line of Richkraft Building Papers.

Appointed Research Director

Dr. Fred E. Kendall has been appointed director of research of The Master Builders Co., Cleveland. For five years prior to joining the research staff of The Master Builders Co., Dr. Kendall was chief of research, chemistry of The Republic Steel Corporation. He will be head of the Master Builders Co., laboratory working with Dr. E. W. Scripture, Jr., Vice President in Charge of Research.

Feyen Promoted by I-H

W. K. Perkins, manager of sales, International Harvester motor truck division, has announced the following change in branch personnel: J. P. Feyen, formerly retail truck manager at Fresno, Calif., has been promoted to assistant manager at the Spokane branch. Mr. Feyen started with the Harvester Co. at Denver, Colo., in 1938 and served at that branch in various capacities until his transfer to Fresno as retail manager in August, 1944.

New Davey Dealers

Vogel-Birch, Inc., Ashland, Ky., has been appointed a Class B dealer for Davey Compressor Co., Kent, O. Territory includes the Kentucky counties of Lewis, Greenup, Boyd, Carter, Rowan, Fleming, Elliott, Bath, Morgan, Menifee, Johnson, Martin, Magoffin, Floyd, Pike and Letcher. In Ohio Vogel-Birch will operate in Scioto, Lawrence, Jackson, Gallia and Meigs counties. C. R. Smith & Sons, Youngstown, O., has been appointed a Class A dealer, covering the counties of Mahoning, Trumbull and Columbiana in Ohio; also the city of Alliance. In Pennsylvania, its coverage will include the city of Sharon.

½ Cu. Yd.

8' Lift

FRONT END LOADERS
for Industrial Tractors
Write for Catalog

Elkhart White Mfg. Co. Indiana

IN THE SPOTLIGHT!

TUTHILL GUARD RAILS

for safe, sure service

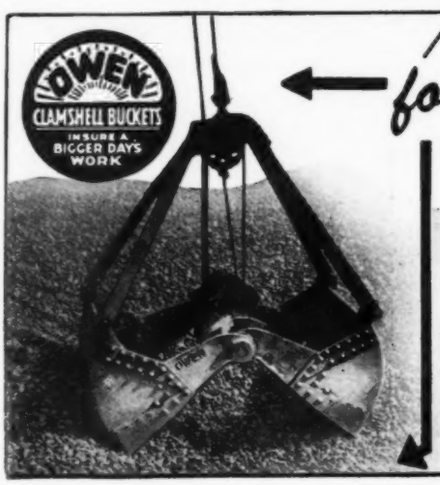
Up-to-date highways need modern guard rail protection. Here's why it will pay you to install the TUTHILL Guard Rail:

SAVES LIVES. The springy, convex rail keeps cars from going off the road. At night, too, it shows up clearly under headlights, plainly marking the course of the road.

SAVES DOLLARS. The one-piece, weatherproof Tuthill Guard Rail is simplicity itself. Easy and quick to erect. Never can sag. Requires little or no maintenance.

Be wise. Select the Tuthill Guard Rail for your highway installations.

TUTHILL SPRING CO.
761 W. POLK STREET, CHICAGO 7, ILLINOIS



← for **OWEN BUCKETS** *are popular* **LOW HEADROOM**

and thus are more adaptable to various operating conditions.

Owen Bucket heads are one-piece alloy steel castings, light enough to prevent top heaviness and designed for rigid arm connections.

Special head design eliminates wear on upper arm ends. Rack and wobble is prevented.

A MOUTHFUL AT EVERY BITE

The Owen Bucket Company
6070 Breakwater Avenue, Cleveland, Ohio
Branches: New York • Philadelphia • Chicago • Berkeley, Cal.

Barney Devine Made Vice President

B. F. Devine

B. F. (Barney) Devine has been elected a vice president of Chain Belt Co., Milwaukee, Wis. He joined the company in 1909, and has devoted all his time since then to the construction machinery industry. He served as sales manager and later manager of the Construction Machinery Division. He will continue his duties as manager of that division. L. B. McKnight, who started with the company in 1927, has also been elected vice president with executive responsibility for the two heavy machinery divisions, Conveyor and Process equipment and the Construction Machinery. O. W. Carpenter has been elected a vice president of Chain Belt Co. in charge of finance. Mr. Carpenter was formerly secretary-treasurer and a director of the Kearney and Trecker Co., and came to Chain Belt in 1943.

Veteran Mack Official Retires

C. W. Haseltine

Ending a 35-year career with Mack Trucks, Inc., C. W. Haseltine, vice president, secretary and treasurer of that organization as well as director of Mack Manufacturing Corporation, manufacturing subsidiary, retired on Dec. 31. He joined Mack as a bookkeeper and statistical clerk in 1912—just 12 years after Mack built and sold its first vehicle. Appointed assistant secretary and assistant treasurer of the company in 1917, and made secretary and treasurer in 1918, Mr. Haseltine, through his unusually keen financial ability and vision, heavily influenced the growth and development of the Mack organization. Coincident with Mr. Haseltine's retirement comes Mack's announcement of the appointment of F. W. Sommer as treasurer and T. V. Homan as secretary of the company.

New Corporation Formed

The formation of the new Ward LaFrance Truck Corporation, Elmira, N. Y., has been announced by Joseph G. Grossman, president. The new corporation has acquired all the business and assets of the former Ward LaFrance Truck Division of the Great American Industries, Inc. The Ward LaFrance Truck Corporation is controlled by Mr. Grossman and will be operated by him and A. Ward LaFrance, vice president, both of whom have been identified with Ward LaFrance equipment for the past 30 years. They will continue the production of heavy-duty trucks, fire engines, and trolley coaches.

New Koehring Distributor

Koehring Co., Milwaukee, Wis., has announced appointment of Sweeney Brothers Tractor Co., Fargo, N. D., as distributor for Koehring products in the state of South Dakota. Simultaneously, Kwik-Mix and Parsons announced that Sweeney Brothers will distribute Kwik-Mix concrete, plaster mortar and bituminous mixers; and Parsons trenchliner trenchers, both ladder and wheel types.

save time between jobs with JAHN TILT TRAILERS

Tilt—load—and you're off in a matter of minutes with a Jahn Tilt Trailer. No jacks or loading ramps required. One-man operation. Positive, automatic safety lock holds platform in position when loaded or empty. Rubber mounted drawbar absorbs road shocks and protects both truck and trailer. Ideal for transporting tractors—rollers—compressors—shovel-loaders—mixers, etc. Jahn Tilt Trailers are available in 8 ton capacity tandem axle and 5 ton capacity single axle models. Write for specifications and illustrated bulletin or see your nearest Jahn distributor.

JAHN TRAILERS ALL OVER THE WORLD

C. R. JAHN COMPANY
Dept. 1345—1106 W. 35th Street, Chicago 9, Illinois
Heavy duty trailers from 5 to 100 tons

Shunk Snow Plow and Ice Removal BLADES
Proved record of superior performance. Made of specially developed steel to withstand severe service conditions.
FOR ALL TYPES AND MODELS OF SNOW PLOWS
Various widths, lengths, thicknesses--flat or curved--standard or special--punched ready to fit your machine.
SHUNK SAW-TOOTH ICE BLADE
Amazingly effective. Thoroughly breaks up and removes heavy, slippery ice and snow formations. Replaces all types of snow plow blades or maintenance units. Write for Bulletin and name of nearest Distributor.

Shunk
MANUFACTURING COMPANY
ESTABLISHED 1854
BUCYRUS, OHIO.

PORTABLE ASPHALT PLANTS
High Production—Low Cost

THE McCARTER IRON WORKS, INC.
NORRISTOWN, PENNA.

VULCAN PAVEMENT AND CLAY DIGGING TOOLS

ARE MADE in a complete line of sizes to fit all standard compressed air hammers.

Send for NEW Vulcan Illustrated CATALOG today.

TOOLS — THE WORLD OVER — NOTED FOR QUALITY AND DURABILITY

VULCAN TOOL MFG. CO.
QUINCY, MASS.

W. A. Roberts Elected Vice President

W. A. Roberts and W. C. Johnson, executive vice-presidents of Allis-Chalmers Manufacturing Co., Milwaukee, Wis., have been elected to the firm's board of directors. Roberts is executive vice-president in charge of the company's tractor division while Johnson is executive vice-president for the general machinery division. The new directors succeed the late Dr. Charles E. Albright and Harold S. Falk, president of the Falk Corporation. Falk had submitted his resignation because of other business requirements.

W. H. Kershaw Retires

William H. Kershaw, assistant general sales manager of The Texas Co., has retired after 37 years of service with the company. He began his career with the 8-year-old Texaco organization in 1910 as a road engineer, after several years' experience in civil engineering, which he had studied at the University of Pennsylvania. Two years later he became manager of the company's Paving and Roads Division, later known as the Asphalt Sales Department. He was appointed assistant general sales manager in 1936 and assumed general administrative duties. During the war he was in charge of Texaco's domestic sales and served on many petroleum industry committees.

W. H. Kershaw

Comer Elected Director

Hugh Comer, Alabama cotton manufacturer, has been elected to the board of directors of Allis-Chalmers Manufacturing Co., Milwaukee, Wis. Comer is president and treasurer of Avondale Mills, Sylacauga, Ala., and chairman of the board of Boaz Mills, Inc., Boaz, Ala. He replaces John H. Collier, chairman of the board for the Crane Co. of Chicago, who resigned because of ill health.

New Buffalo-Springfield Distributor

The O. S. Stapley Co., Phoenix, Ariz., has been appointed exclusive distributor for Buffalo - Springfield rollers in the state of Arizona.

Bob Fox Organizes Company

Robert H. Fox, for the past 7 years sales engineer for Six Wheels, Inc., has formed his own company to be known as the Robert H. Fox Company, with offices at 14730 Vanowen Boulevard, Van Nuys, Calif. The company will specialize in the engineering and sales of special off-the-highway trucks, cranes, shovels and crane carriages. It will also represent several Eastern manufacturers in the Western states.

R. H. Fox

Appointed Distributor for Mead Hevitrailer

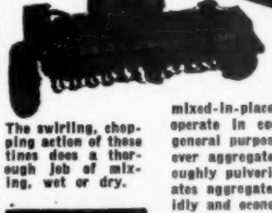
Dravo-Doyle Co., Pittsburgh, Pa., has been appointed distributor in Western Pennsylvania and Eastern Ohio for the Mead Hevitrailer, designed for handling construction equipment up to 25 tons. The principal feature is a new type fifth wheel designed to fit in any dump truck bed.

The unit is built in three sizes: 10, 15, and 25 tons.

Forms West Coast Subsidiary

The Air Reduction Co., New York, N. Y., has formed a new wholly owned subsidiary, the Air Reduction Pacific Co. H. P. Etter, formerly sales manager of the Pacific Coast Division, is president and director of Air Reduction Pacific Co. His headquarters are Room 1813, Mills Tower, 220 Bush St., San Francisco 4, Calif.

ARIENS AGGMIXER
FOR SECONDARY ROAD CONSTRUCTION



The swirling, chopping action of these tines does a thorough job of mixing, wet or dry.

Here's equipment designed especially for mixed-in-place construction — to operate in connection with other general purpose equipment. Wherever aggregates are used it thoroughly pulverizes, mixes and aerates aggregates with binder—rapidly and economically. Also ideal for soil cement stabilization. Safe and easy to operate . . . adjustable to any tractor . . . made 4 standard sizes, 4', 5', 6' and 7'. Write for details.

ARIENS COMPANY
BRILLION, WIS.

Scherer Promoted by Ransome

W. H. Scherer

W. H. Scherer, formerly assistant to the vice president in charge of manufacturing, Worthington Pump and Machinery Corporation, has been appointed general manager and elected a director of the Ransome Machinery Co., Dunellen, N. J. Mr. Scherer has served as acting manager of Ransome, a subsidiary of Worthington, since June, 1947.

Licensed to Make Snow Plows

The Walsh Holyoke Boiler Works Division of Continental-United Industries Co., Inc., Holyoke, Mass., has been licensed to manufacture and market the Sargent tripping blade snow plow in all New England states, and in New York, New Jersey, and Pennsylvania. This equipment was formerly manufactured by Maine Steel, Inc.

New Distributor for Carter

Clark-Wilcox Co., Boston, Mass., has been appointed exclusive sales agent for Ralph B. Carter Co., Hackensack, N. J., in the states of Massachusetts, Maine and New Hampshire. They will handle the complete Humdinger line of self-priming centrifugal pumps and the Cater single and double diaphraghm unit.

Booklets and Pamphlets Received

"Second Annual Report of the Federal Airport Act" for 1947. Published by U.S. Department of Commerce, Civil Aeronautics Administration. Includes brief resume of developments since previous reports. Available on request to C.A.A., Washington, D. C.

•

"Uses of Traffic Accident Records," a manual prepared by the Committee on Uses of Developed Information, National Conference on Uniform Traffic Accident Statistics. Published by the Eno Foundation for Highway Traffic Control, Inc., Saugatuck, Conn. Available for free distribution to interested or qualified parties.

"Preliminary Report on a Master Highway Plan for the Boston Metropolitan Area"; 32 pages plus maps and drawings. Submitted December 1, by the joint board for the metropolitan master highway plan, to the governor of Massachusetts. Includes a partial report by consulting engineers, Charles A. Maguire and Associates, in cooperation with other consultants. Projects nine proposed expressway sections totaling eighty miles in length, and estimated to cost $325,000,000.

•

"Maintenance of Concrete Runways, Taxiways and Aprons", by W. R. Macatee, Mgr., Airport Div., has been issued by the American Road Builders' Association in Washington. Technical bulletin No. 128, 50c per copy. Among the valuable subjects covered by this practical 30-page manual are: Factors governing strength of concrete; stress effect of temperature and moisture on concrete; cause of voids in subgrade; repair methods for concrete pavements; crack-sealing methods; filling voids in subgrade; and replacement of broken slab areas; emergency patching; methods of making surface patches.

$500,000 AUCTION of
Construction & Road Eqpt.
TRUCKS—SHOP EQPT.—SUPPLIES

to be held at
Chas. T. BROWN CO.
1955 West 6th Street
San Fernando, Calif.
Tues., Feb. 24
10:30 a. m.

D8 Caterpillar Tractors . . . Caterpillar Tractor parts . . . Carryalls . . . Motor Graders . . . Road Rollers . . . Tamping Rollers . . . Trucks . . . Diesel Tractor Trucks . . . Equipment . . . Mounted Trucks . . . Truck Cranes . . . Shovels . . . Draglines . . . Cranes . . . Asphalt Paving Equipment . . . Concrete Paving Equipment . . . Loaders . . . Trenchers . . . Pumps . . . Compressors . . . Batching Plant . . . Welders . . . Cement Mixers . . . Locomotive Steam Cranes . . . Machine Shop Equipment . . . thousands of miscellaneous construction parts, tools and supplies of every description.

Inspection on premises from Feb. 16 to date of sale.

Be wise, buy and sell through
DAVID WEISZ, *Auctioneer*
840 San Julian St. Los Angeles, Calif.
Michigan 8005

In
CLEVELAND
IT'S THE
HOLLENDEN

1000 ROOMS WITH BATH
RADIO IN EVERY ROOM
SIX FINE RESTAURANTS
CENTRAL DOWNTOWN LOCATION
GARAGE ATTACHED

•
JAMES J. FITZPATRICK
GENERAL MANAGER

CLEARING HOUSE

FOR RENT

Approximately 100 ton of New Bethlehem Section AP-3 Sheet Piling in 60' lengths.

A. S. WIKSTROM, INC.
Skaneateles, New York

20—NORTHWEST SHOVELS, Model 25, with Trench-Hoe, Dipper and Crane attachments, Caterpillar D-4600 Diesel Engines, practically new.

For Sale or For Rent

KEN ROYCE INC.
185h Bayshore Blvd., San Francisco 24
Atwater 2-1830

TRANSITS and LEVELS

New or Rebuilt

Sale or Rent

Headquarters for REPAIRS—any make. Factory service. We will also *buy* your old instruments or take them in *trade*.

A complete line of engineering Instruments and Equipment for Field or Office. Write for Bulletin RS-142.

WARREN-KNIGHT CO.
Manufacturers of Sterling Transits and Levels
136 N. 12th St. Philadelphia 7, Penna.

WAR SURPLUS TRANSIT BOOKS

FOR SALE at a VERY LOW PRICE

They are 80-page regular size, well bound transit books, and are ruled thus: 20 horizontal lines, 2 vertical lines on the left page and one vertical line on the right page.

WE ARE PREPARED TO SHIP THESE BOOKS TO YOU AT ONCE. PRICES ARE AS FOLLOWS:

In lots up to 50.....50c each
In lots from 51 to 200.....45c each
In larger lots.....35c each
These exceptionally low prices are all F.O.B. Fergus Falls, Minnesota.

If a sample copy is desired, we will forward one to you immediately upon request.

Mail all orders and requests to
George W. Pushing,
206 Lincoln Ave. West,
Fergus Falls, Minnesota

FOR SALE

1—Factory Rebuilt Model 48-B Bucyrus-Erie Combination Clamshell Dragline with 60' Boom, Serial No. 12291. Powered by Model 6-D-1742 Buda Diesel Engine. Good Condition—Price $22,500.

HAMPTON ROADS TRACTOR & EQUIPMENT COMPANY
W. 39th Street & Killam Ave.
Norfolk, Virginia Phone 2-2717

DEPENDABLE USED MACHINES

Butler Carscoop.
Browning 20-ton crane.
Pioneer 16-V road gravel plant.
Osgood Model 200 backhoe.
Carter 4" pump.
Truck crane on 10 pn. tires.

TRACTOR & EQUIPMENT CO.
3521 W. 51st St. Chicago, 32

FOR SALE

Detroit Sweeper, Serial NL5002, hydraulically operated. Recently used on Ford-Ferguson Tractor. Cost new $500. In good serviceable condition with new rotary broom. Price, subject prior disposition, $300.00.

CLIFFORD WATERHOUSE
Jackson Tel. 2-0617 Mississippi

PORTABLE GREASE DISPENSER
ANOTHER WAR SURPLUS BARGAIN

Brand new in original crates, tested and guaranteed: Fully portable, powered by gasoline engine, provides on-the-job high-pressure and/or gear-box lubrication for heavy equipment. Made by Alemite Div. of Stewart-Warner Corp. Write for details.

WAR SURPLUS ENGINEERING COMPANY
921 E. Pico Los Angeles 21, Cal.

FOR SALE

One Northwest Model 25 Shovel Boom in good condition, complete.....$1650.00

One Anderson snow-plow with pump, fits I-4 International Tractor, new..... 275.00

One 1943 Allis-Chalmers tractor Model W. K. equipped with a Baker Bulldozer, new tracks, pads, rollers, sprockets, idlers, tractor in good condition..... 5250.00

One Model M-766 Buda Engine serial #250157 complete with radiator, starter, generator, magneto, includes clutch. Motor in good condition..... 850.00

One D-4 Caterpillar with LaPlante Choate angle dozer, excellent condition. 4750.00

These can be inspected at our yard and for further information regarding the above mentioned equipment, write or call

ANGELO DiPONIO
16596 Greenfield Detroit 27, Mich.
VErmont 7-3660

GRADER *For Sale*
Rome 404 Tandem Drive-Diesel

This machine has 12 ft. blade, scarifier, enclosed cab, serial #404-809. Used only three months. Price $9,939.00 net f.o.b. Albany.

R. B. WING & SON CORP.
384 Broadway *Phone 3-4161* Albany, N. Y.

FOR SALE

2—Late Model 4½-HM Jaeger, slightly used 4½ yard Truck Mixers in A-1 condition. Price each $4,350.00.

NORTH CAROLINA EQUIPMENT COMPANY
3101 Hillsboro Street, Raleigh, N. C.
Telephone—8836

PORTABLE HEATER
WAR SURPLUS BARGAIN

Type D-1 Stewart-Warner ground heater. Produces 100,000 BTU/Hr.—All gasoline driven—Absolutely no fumes. Priced $250 FOB our warehouse in Missouri. Send cash, check or money order to

JUSTEE INC., 1321 W. 4 St., Los Angeles, Calif.

FOR SALE

RD8 Caterpillar Tractor, equipped with Caterpillar PCU, Canopee Top and Push Pan, also LeTourneau "U" Wagon, all in good condition to be sold as unit.

CARL GOODWIN & SONS
Allegan, Michigan

HEAVY EQUIPMENT AUCTION

Offering for highest bidder—
Caterpillar Motor Grader #12
D-8 Tractors
D-18- Tractors
and other heavy construction equipment.

For further information, write

FRANK EBLEN CONSTRUCTION CO.
Atlantic, Iowa

FOR SALE

Waterproof—High wet strength. Sub grade paper.

PROTECTIVE PAPERS
Union, Illinois

FOR SALE

AUSTIN-WESTERN Street Sweeper, model ASV81B. Ser. P2010. Overhauled. Guaranteed. $1,850.00.
GALION 8-12-ton Diesel Tandem Roller. Guaranteed, like new. $3,250.00.
GOOD ROAD SPREADERS, rubber tired. Late model. New. $110.00.
BUCKEYE #70 Clipper, Ser. #4233. ¾ cu. yd., latest model, combination shovel-dragline-backhoe. All buckets. Shows hardly any wear. $9,500.00. Would rent.
OSGOOD #200, Ser. #5028. New 1946. 35-ft. boom, with ½-yd. dragline bucket. A-1. $6,500.00. Would rent. Shovel front $1,500.00 additional. Backhoe attachment $1,000.00 additional.
MARION #362, Ser. #7473. Shovel, dragline and clamshell. D-13000, Cat. engine. 1½ cu. yd. dipper, 23-ft. boom, 18-ft. dipper—60 ft. dragline boom. New 1941. Excellent. $23,000.00.
BACKHOE attachments for Bucyrus-Erie 10B., Lorain #30 and Unit 10-20.
SHOVEL attachment for Bucyrus-Erie 15-B.
BOOMS: 2 Northwest 45-ft. and 55-ft., with high gantries; 50-ft. heavy duty for Lima; 60-ft. with 18-ft. jib for Lorain; 30-ft. for P.H. #150; etc.
DEMPSTER LF-200 Dumpsters with buckets. Good. $500.00 per set.
MILWAUKEE Hydr. Crane on 1946 Chevrolet. First class. Used little. $4,500.00.
NORTHERN Coal Conveyor, portable, 35 ft., with 4-cyl. Wisconsin Power Unit. Like New. $750.00.

For FWD Trucks

New complete Transmission and Transfer Assembly. Parts No. 13375 and No. 21438. Original cost $1,590.00. Our price $650.00.

WENZEL MACHINERY RENTAL & SALES CO.
2136 Jefferson Street
Kansas City, Mo.

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Check reference to advertisement or to items of equipment or materials on which you wish to receive information. Give your name and address in the space at foot of page (if convenient, please print or use typewriter), detach page and mail to ROADS AND STREETS, Readers' Service Department, 22 West Maple Street, Chicago 10, Ill. We will pass your inquiry along to manufacturers and see that you get desired information promptly.

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Check other products below on which you wish us to obtain information for you:

AGGREGATE:
- ☐ Bins and Hoppers
- ☐ Conveyors
- ☐ Crushers
- ☐ Portable Plants
- ☐ Screens

BITUMINOUS:
- ☐ Batchers
- ☐ Finishers
- ☐ Distributors
- ☐ Dryers
- ☐ Heaters
- ☐ Plants (central)
- ☐ Plants (travel)

CONCRETE:
- ☐ Batchers
- ☐ Buggies and Carts
- ☐ Finishers
- ☐ Joints, Expansion and Contraction
- ☐ Reinforcement Accessories
- ☐ Metal Road Accessories
- ☐ Mixers (under 1 yd.)
- ☐ Mixers (1 yd. up)
- ☐ Pavers
- ☐ Reinforcing Steel
- ☐ Road Forms (1000' set)
- ☐ Tower
- ☐ Truck Mixers

CRANES:
- ☐ Crawler Mounted
- ☐ Truck Mounted
- ☐ Piledrivers

GRADERS:
- ☐ Blade, self propelled
- ☐ Blade, pull type
- ☐ Blade, under truck
- ☐ Elevating

LOADERS & TRENCHERS:
- ☐ Front-end loader (tractor mounted)
- ☐ Loader, bucket type and belt type
- ☐ Trencher or Ditcher

HAULING EQUIPMENT:
- ☐ Dump Trucks, self-powered
- ☐ Dump Wagons, tractor drawn
- ☐ Flatbed Trailers
- ☐ Other Trucks

PUMPS:
- ☐ Centrifugal
- ☐ Concrete
- ☐ Diaphragm
- ☐ Mud Jacking
- ☐ Piston
- ☐ Wellpoint

POWER UNIT:
(Independent)
- ☐ Gasoline
- ☐ Diesel
- ☐ Electric

ROLLERS:
- ☐ Power (Smooth)
- ☐ Pneumatic Tire
- ☐ Sheepsfoot

TRACTORS:
- ☐ Crawler
- ☐ Rubber-Tired

TRACTOR EQUIPMENT:
- ☐ Dozers
- ☐ Power Control Units
- ☐ Rippers
- ☐ Scrapers, tractor drawn
- ☐ Scrapers, self-powered

BUCKETS:
- ☐ Clamshell
- ☐ Concrete
- ☐ Dragline
- ☐ Orange Peel

SHOVELS & DRAGLINES:
- ☐ Crawler (under 1 yd.)
- ☐ Crawler (1 yd. up)
- ☐ Truck Mounted

ROCK DRILLS & AIR TOOLS:
- ☐ Air Compressors
- ☐ Backfill Tampers
- ☐ Clay Diggers
- ☐ Concrete Vibrators
- ☐ Drills, cabel tool
- ☐ Drills, tripod and wagon
- ☐ Drills, rock, hand-held
- ☐ Paint Sprayers
- ☐ Paving Breakers
- ☐ Riveters and Chippers

MISCELLANEOUS:
- ☐ Buildings, portable
- ☐ Earth Drills, power
- ☐ Light Plants
- ☐ Lubrication, Service Truck
- ☐ Mowers, Highway
- ☐ Power Saws
- ☐ Soil Stabilizing Equipment
- ☐ Snowplows, rotary
- ☐ Snowplows, v or wing
- ☐ Spreaders, sand or cinders
- ☐ Street Flushers
- ☐ Street Sweepers
- ☐ Welders
- ☐ Cutting Torches
- ☐ Hydraulic Jacks
- ☐ Hydraulic Control Equipment
- ☐ Hand Tools
- ☐ Hoists, derrick type

Be sure to fill in name and address below:

Your Name ..... Title or profession .....

Name of your company or governmental department .....

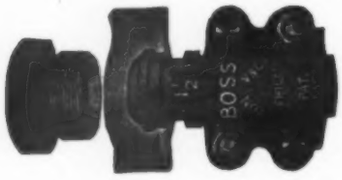
Type of work for which equipment will be used .....

Street Address .....

City ..... State ..... County .....

Quality THAT MEANS MAXIMUM SERVICE, SAFETY AND ECONOMY

The design, workmanship and finish of the couplings described below combine to assure unequalled service efficiency with important savings in hose replacement costs.



"G J-BOSS" GROUND JOINT, STYLE X-34 FEMALE HOSE COUPLING

For all high or low pressure steam, air and fluids, including oil, hydraulics, butane, etc. Washerless construction provides a leakproof, soft-to-hard metal seal between stem and spud. Malleable iron "Boss" Offset and Interlocking Clamp exerts powerful, full-circumference grip on the hose—proof against blow-offs. Cadmium plated—rustproof. Sizes ¼" to 6".

Note: For washerless couplings of otherwise identical design, specify "Boss" Female Couplings, Style W-16.

"BOSS" MALE COUPLING STYLE MX-16

Companion coupling to both the "G J-Boss" and "Boss" Female Couplings. Corrugated stem has strong hex section for wrench and collar to engage extensions on clamp segments. Clamp is efficient "Boss" Offset and Interlocking construction. Sizes ¼" to 6", with each size fitting same size straight end hose.

Stocked by Manufacturers and Jobbers of Mechanical Rubber Goods

IF IT'S A DIXON BOSS PRODUCT

IT'S DEPENDABLE

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Main Office and Factory: PHILADELPHIA, PA.
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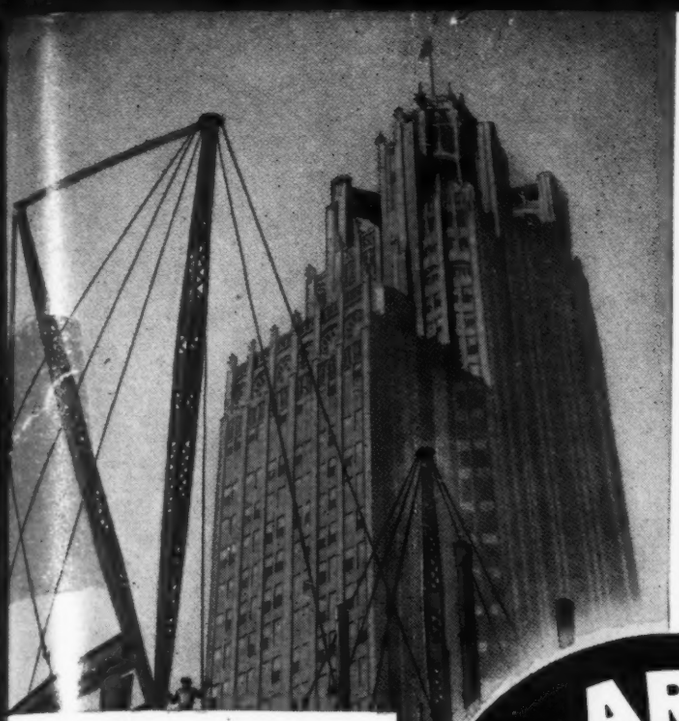
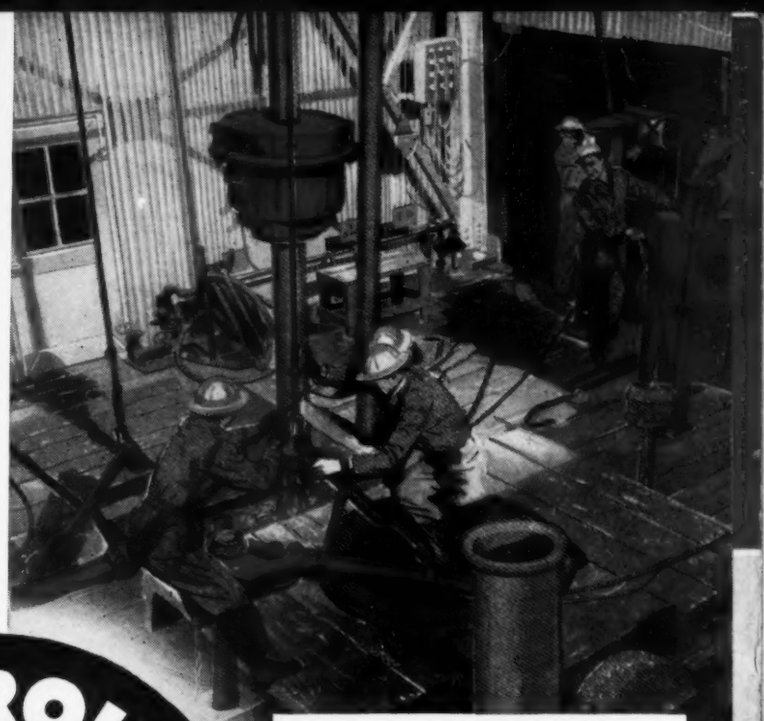
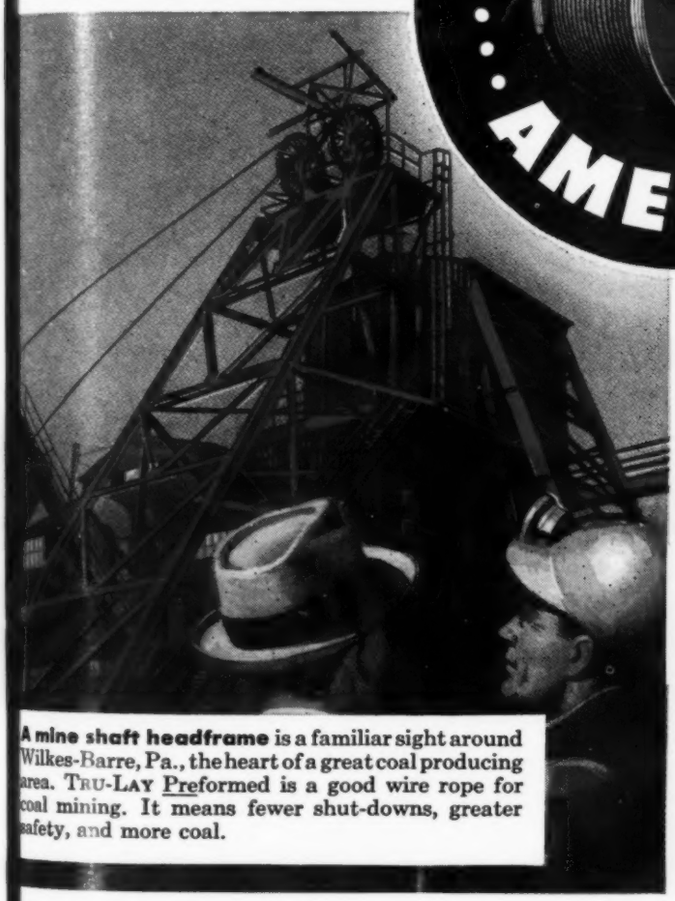


Chicago Tribune builds multi-story addition to its famous landmark. TRU-LAY Preformed Wire Rope is daily lifting tons of steel—helping to build a greater America. It's dependable and long-lasting.



Robert Lee, Texas, booms from new oil drilling operations. TRU-LAY Preformed does its share on the big, deep rotary drilling rigs. Drillers like its ease of handling and long-wearing qualities.

ALL AROUND AMERICA



A mine shaft headframe is a familiar sight around Wilkes-Barre, Pa., the heart of a great coal producing area. TRU-LAY Preformed is a good wire rope for coal mining. It means fewer shut-downs, greater safety, and more coal.

In Idaho trees grow large and tall. Cutting them down is one thing. Getting them out of the forest is another. TRU-LAY Preformed arch lines are made of a special "Seale" construction that gives longer, safer, cheaper service.

ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Seattle, Bridgeport, Conn.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE

In Business for Your Safety

Tru-Lay *Preformed* **Wire Rope**

UP GOES YOUR FOOTAGE

DOWN COME YOUR COSTS

When your drills are protected against wear and rust with *Texaco Rock Drill Lubricants E. P.*

THERE is less work for the "drill doctor" when you keep drills in condition with *Texaco Rock Drill Lubricants E.P.* These fine "extreme pressure" lubricants have ample film strength to protect moving parts under even the severest conditions.

In addition, *Texaco Rock Drill Lubricants E.P.* resist oxidation, flow readily, and prevent rust whether drills are running or idle. Their use helps you drill more footage, assures less servicing, longer drill life.

Texaco Rock Drill Lubricants E.P. are approved by leading rock drill manufacturers. Use the viscosities recommended for your particular drills and operating conditions. And to keep your compressors efficient — valves clean, rings free, airlines clear — use the recommended *Texaco Alcaid, Algol or Ursa Oil.*

A Texaco Lubrication Engineer will gladly advise you. Just call the nearest of the more than 2500 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

TEXACO

TEXACO Rock Drill Lubricants E. P.

TUNE IN . . . TEXACO STAR THEATRE presents the TONY MARTIN SHOW every Wednesday night. • METROPOLITAN OPERA broadcasts every Saturday afternoon.